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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 1, NUMBER 6
JUNE 1968

Selected Water Resources Abstracts includes abstracts of current monographs, journal articles, translations, and reports. The contents of these documents cover the physical, life, and social science, as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water.

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SELECTED
WATER RESOURCES ABSTRACTS

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UNITED STATES DEPARTMENT OF THE INTERIOR
WATER RESOURCES SCIENTIFIC INFORMATION CENTER

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CHEMICAL ENGINEERING

R202796X67A CATHODIC PROTECTION OF TURBINES

Corrosion-cavitation damage is one of the main factors determining selection of design and materials for the manufacture of hydraulic turbines, pumps, propellers, and other mechanical equipment washed by a stream of high-velocity fluid. Originally cavitation was thought to result from purely mechanical action of hydraulic shocks upon collapse of cavities in zones of local change of velocities and pressures of the fluid. Analysis of metal behavior in a cavitating flow showed cavitation could not be satisfactorily explained on this basis. However, if metal damage in rapidly flowing fluids is regarded as a complex, combined mechanical and corrosive action, the damage can be explained as corrosion-cavitation. A method to protect impellers and turbine linings against corrosion-cavitation by painting with zinc paint and applying cathodic protection is discussed. This technology of protection is simple and requires no new special equipment or modification of the units. A 3-yr test on unit No 18 of the V I Lenin Volga Hydroelectric Power Station has confirmed high effectiveness of this method of corrosion-cavitation protection.

R202796X67A

Trifel, M S; Shtern, E P; Khanlarova, A G; et al

CATHODIC PROTECTION OF TURBINES AGAINST CORROSION-CAVITATION DAMAGE

Hydrotech Constr, No 2, pp 110-115, Feb 1967. 6 p, 3 fig, 2 tab

DESCRIPTORS-- / *corrosion/ corrosion control/ *cathodic protection/ zinc/ *cavitation/ electric potential/ *hydraulic turbines/ hydrulic machinery/ electrolysis/ electric currents/ protective coatings/ primers (painting)/ polarization/ anodes/ stainless steel/ electrodes/ experimental data
IDENTIFIERS-- / foreign research/ USSR/ *cavitation control/ cavitation resistance/ electrolytic corrosion/ epoxy resins

CIVIL ENGINEERING (GENERAL)

R202793X67A PIPE WITH CONCRETE BEDDING

An analysis of buried concrete pipe embedded in concrete shows that pipe and encasement should be treated as acting together because shear and diagonal tension at the surface of contact between pipe and concrete bedding are generally low. Even the maximum shear in localized areas is not high enough to break the bond, especially since stress normal to the surface of contact is always compressive. Tables are used to extend the solution to different thicknesses of encasement. Encasement thickness also may be different at side and bottom. If the proportions of radius to pipe shell thickness and to thickness of encasement are the same the entire solution can be made by proportioning. Overall conditions of cover and hydrostatic pressure must be considered, and possibly no general statement can be made defining the best proportions for the encasement. In some cases of higher head, full encasement is more desirable than semiencasement; this may also be true for very high earth cover. Critical sections for stress will vary for different combinations of earth and internal pressure, but generally these will be at top and bottom at the vertical centerline and at the sides at horizontal centerline. Overall economics of pipe and encasement must be the ultimate consideration.

R202793X67A

Olander, Harvey C and Robertson, Gordon G

STUDY OF PIPE WITH CONCRETE BEDDING

Amer Soc Civil Engs Nat Meeting Water Resources Eng, New York, N Y, Conf Preprint 573, Oct 1967. 46 p, 14 fig, 8 tab, 5 ref

American Pipe and Construction Co, Monterey Park, Calif

DESCRIPTORS-- / *pipes/ *pipelines/ *bedding materials/ earth pressures/ *concrete pipes/ construction/ fills/ embankments/ high pressures/ vertical loads/ hydrostatic pressures/ shear stress

IDENTIFIERS--/ *pipe laying/ *pipe bedding/ buried pipes/ elastic foundations/ *pipeline design

R202797 67A RESERVOIR SHORE PROTECTION
The Novosibirsk Reservoir on the Ob River in western Siberia was subjected to winds of 35 m/sec and wave heights of 2.8 m after being filled in 1959. Portions of the riprap revetment were destroyed leaving the embankment and shoreline vulnerable to scour. To provide protection, an inshore shoalbeach about 6 km long was constructed by hydraulic filling. Width was 180-200 m; thickness 5 to 10 m; and volume 4,730,000 cu m. Slope was 30 to 1. Stability of the artificial beach was studied for 3 yr and data recorded for wave action, sediment movement, reservoir water surface elevation, and beach profile changes. Results indicate that an artificial beach of this type gives effective shore protection.

R202797 67A

Kaskevich, L N and Savkin, V M

ARTIFICIAL BEACH AS AN EXPERIMENTAL TYPE OF RESERVOIR BANK PROTECTION

Hydrotech Constr, No 2, pp 139-142, Feb 1967. 4 p, 3 fig, 4 tab, 4 ref

DESCRIPTORS--/ *beach erosion/ beaches/ *reservoirs/ *bank protection/ riprap/ wind (meteorology)/ *erosion/ waves/ wave action/ hydraulic fills/ turbidity/ sands/ foreign design practices/ stability analysis/ *erosion control

IDENTIFIERS--/ USSR/ wave height/ bedload movement/ Novosibirsk Reservoir, USSR/ slope stability

R202798X67A WATER SURFACES MEASURED BY STEREOGRAPHY
Use of ground stereophotogrammetry provides a way to record instantaneously and to measure later the mutual positions of the characteristic points of the water surface over a large area. The method is based on the intersection principle and permits obtaining space coordinates of any point. The method is described and optimum conditions for use are noted. Four applications of the method are given as used on hydrualic engineering problems in the USSR. These applications include measuring the water surface of a reservoir as it is filled and determining the elevations of the free water surface in a tailrace of a powerplant during spring flood. The average error of determining the water surface elevation of the reservoir on the Vakhsh River was plus or minus 3.4 cm. The method of ground stereophotogrammetry will undoubtedly find further application in hydraulic engineering with the use of additional special equipment.

R202798X67A

Maslovskii, E B and Dement'ev, V E

SOLUTION OF CERTAIN HYDRAULIC ENGINEERING PROBLEMS BY THE GROUND STEREOPHOTOGRAMMETRIC METHOD

Hydrotech Constr, No 2, pp 146-150, Feb 1967. 5 p, 3 fig, 1 tab, 4 ref

DESCRIPTORS--/ *photogrammetry/ *photographic equipment/ photography/ *hydraulic engineering/ *stereoscopic photography/ water surface/ water surface profiles/ hydraulic structures/ hydrologic data/ hydrologic instruments/ tailrace/ hydroelectric powerplants/ reservoir surveys/ theodolites/ hydrology/ surveying
IDENTIFIERS--/ foreign research/ USSR

R202833X68A NEW DRILLING METHODS

Laboratory tests have proven the effectiveness of 25 new drills to drill or break rock. Although few of these drills have undergone full-scale field tests, some are likely to be used in industry within the next 10 yr. The new drills remove rock by 4 basic mechanisms: thermal spalling, chemical reactions, fusion and vaporization, and mechanically induced stresses. Methods using conventional rock bits, such as electrodrills and turbodrills, are not included in this review. Thermal spalling drills heat the rock surface from 700 to 1100 deg F, causing rock to flake. Some of these drills, jet piercing and forced-flame, can drill hard taconite and quartzite faster than conventional drills. Chemical drills have successfully drilled rock in laboratory tests but have limited potential because of cost and problems involved in handling highly reactive chemicals. Fusion and vaporization drills are versatile and can drill any kind of rock, but are limited to low drilling rates. Drills that remove rock by mechanically induced stress can drill any type of rock and operate in a mud-filled borehole. These drills have the greatest potential for drilling oil wells. Has 110 references.

R202833X68A

Maurer, William C

NEW DRILLING METHODS MOVE CLOSER TO FIELD

Oil Gas J, Vol 66, No 9, 10, 11, and 12, pp 74-79, 69-74, 91-98, 85-86, Feb 26, Mar 4, 11, and 18, 1968. 20 p, 30 fig, 4 tab, 110 ref

Esso Production Research Co, Houston, Tex

DESCRIPTORS-- / *drilling/ *drilling equipment/ *drills/ drill holes/ rocks/ boreholes/ bibliographies/ rock excavation/ thermal stress/ fusion/ vaporization/ chemicals/ mechanical waves/ electric arcs/ melting/ heating/ electrons/ laser/ microwaves/ penetration/ explosions/ engineering geology

IDENTIFIERS-- / *rock breakage/ jet piercing/ plasma jet/ ultrasonic drilling

R202856 67A CONSTRUCTION COST OF MUNICIPAL SEWERS

Grants-in-aid for municipal waste treatment works construction were first authorized under the Federal Water Pollution Control Act of 1956 and widely liberalized by Congress in the decade which followed. Commensurately, the dollar volume of construction contracts awarded for these facilities has steadily increased. To accurately assess this increase insofar as it relates to progress in water pollution control, and to estimate the future needs, calls for a thorough understanding of the changing purchasing power of local and Federal funds invested in municipal waste treatment works. These were among the objectives in the Federal Water Pollution Control Administration's development of the sewage treatment plant construction cost index. This report deals with the development of a fixed base, weighted, cost index believed to be a substantially accurate indication of the purchasing power of funds invested in sewage treatment plant construction. This index may be used to evaluate past construction activity and to estimate future sewage treatment plant construction cost requirements for the 20 areas of influence in the United States as well as for the Nation as a whole. Has 33 references.

R202856 67A

Anon

SEWER AND SEWAGE TREATMENT PLANT CONSTRUCTION COST INDEX, CONSTRUCTION COST TRENDS, MUNICIPAL WASTE TREATMENT WORKS AND MUNICIPAL SEWERS

Federal Water Pollut Contr Admin Publ CWT-1, Dec 1967. 59 p, 4 fig, 9 tab, 33 ref, 13 append

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS-- / *sewers/ *construction costs/ sewage treatment/ costs/ waste disposal/ indexes/ sewage works/ waste water/ capital costs/ *sewerage/ sewage disposal/ bibliographies/ waste treatment/ cost analysis/ cost trends/ *municipal wastes

IDENTIFIERS-- / municipal sewers/ cost indexes

R202790X67A SPECIMEN SHAPE AFFECTS TENSILE STRENGTH
The size and shape of concrete specimens inevitably affect direct tensile strength. Cylindrical and prismatic specimens of different sizes but of constant slenderness ratios were tested to determine size and shape effect on such strength. Results indicate, the direct tensile strength decreases as the volume of the specimens increases. The relationship between size and direct tensile strength is given as an exponential function, and is virtually identical for both cylinders and prisms of equal volume. Aggregate size does not influence direct tensile strength as long as the maximum grain size does not exceed a third of the smallest specimen dimension. Tests further indicate direct tensile strength is much less dependent on volume than on slenderness of the specimens. The rapid increase of average tensile strength for smaller specimens can be explained by the higher coefficient of variation encountered in small volumes.

R202790X67A

Spetla, Zdenek and Kadlecek, Vladislav

HOW SIZE AND SHAPE OF SPECIMENS AFFECT THE DIRECT TENSILE STRENGTH OF CONCRETE

Tech Digest, Vol 9, 1967. 8 p, 11 fig, 3 tab, 7 ref

Building Research Institute, Technical University, Prague, Czechoslovakia

DESCRIPTORS-/ concrete/ concrete technology/ *concrete testing/ *tensile strength/ cylindrical bodies/ prisms/ samples/ sizes/ shapes/ laboratory tests/ test procedures/ materials testing/ aggregates/ strength of materials/ volume

IDENTIFIERS-/ foreign testing/ Czechoslovakia/ slenderness ratio/ concrete properties

R202813X68A REACTIVITY OF SAND-GRAVEL AGGREGATES
Field and laboratory studies have shown that sand-gravel aggregates associated with deterioration of concrete in the Kansas-Nebraska region are alkali-silica reactive, while sand-gravels with good service records are not. However, the type of distress observed in the field is not always typical of the distress generally associated with alkali-silica reactivity. Such atypical performance is attributed to severe drying conditions in that part of the country; the resulting concentration and redistribution of alkalies in concrete may bring about reaction with cements of low alkali content. The concrete deterioration is believed due to combined effects of moderate interior expansion, caused by alkali-silica reactivity, and surface shrinkage, caused by unusually severe drying conditions. Has 17 references.

R202813X68A

Hadley, David W

FIELD AND LABORATORY STUDIES ON THE REACTIVITY OF SAND-GRAVEL AGGREGATES

J Portland Cement Ass Res Develop Lab, Vol 10, No 1, pp 17-33, Jan 1968. 17 p, 5 fig, 10 tab, 17 ref, append

Portland Cement Association, Chicago, Ill

DESCRIPTORS-/ *aggregates/ *alkali-aggregate reaction/ bibliographies/ sands/ gravels/ concrete/ *concrete technology/ alkalies/ durability/ portland cement/ cracking/ deterioration/ expansion/ shrinkage/ drying/ limestones/ petrographic investigations/ field investigations/ laboratory tests/ pozzolans
IDENTIFIERS-/ chemical reactions/ mortar bar method/ Kansas/ Nebraska/ *sand-gravel aggregate/ calcium sulfoaluminate

R202792X67A INNOVATIONS IN LAYING AND BEDDING PIPE

New mass production techniques were used in laying approximately 322 miles of pipe of different sizes in the Canadian River Project Aqueduct system in Texas. With a maximum designed capacity of 183 cfs, the system has pipe varying from 96- to 10-in.-id with hydrostatic design heads of 25 to 500 ft. The terrain varies from steep, abrupt, eroded badlands, to relatively flat cultivated land. Conventional methods of pipelaying were abandoned by the contractor after the 1st month, and more efficient and economical procedures were devised. Traveling cradle-cutting machines were developed which excavated the cradle 2 in. below pipe bottom grade. Plastic soil-cement was used for filling the 2-in. space under the pipe. Among other innovations were bell excavating machines attached to power takeoffs of farm tractors. The new pipelaying procedures reduced initial costs by approximately 30%.

R202792X67A

Chappelear, D L and Gloyna, E L

INNOVATIONS IN THE LAYING AND BEDDING OF PIPE

Amer Soc Civil Engs Nat Meeting Water Resources Eng, New York, N Y, Conf Preprint 533, Oct 1967. 26 p, 14 fig, 1 ref, append

Bureau of Reclamation, Lubbock & Amarillo, Tex

DESCRIPTORS-- / *pipes/ *pipelines/ *bedding materials/ *concrete pipes/ earth handling equipment/ aqueducts/ construction/ control structures/ backfills/ trenches/ compaction/ grouting/ hoses/ soil cement/ excavation

IDENTIFIERS--/ *pipe bedding/ *pipe laying/ rigid pipes/ buried pipes/ Canadian River Project, Tex/ *innovation

R202829X68A MORTAR LININGS FOR LARGE STEEL PIPES

The in-place cement mortar lining of large diameter steel water pipes, generally 48 in. in diameter or larger, has become a universally accepted treatment for protecting new pipe from corrosion and tuberculation, and for rehabilitating existing pipelines. The history of cement mortar lining is reviewed and a description is given of the in-place lining method and the lining machine. Installing a lined-in-place pipeline offers advantages in handling a lighter pipe, installation of stulls without danger of damaging previously applied lining, no joints to be manually pointed, and an infrequent need for hand touchups. These factors also have an additional economy in permitting the contractor to install longer pipe sections. The trends in large diameter water pipelines and some recent in-place pipe lining projects are discussed.

R202829X68A

Wolfe, James E

CEMENT MORTAR LINING OF LARGE DIAMETER WATER PIPELINES

Amer Soc Civil Eng Conf, San Diego, Calif, Feb 1968. 18 p, 3 fig, 11 ref

Pipe Linings, Inc, Wilmington, Calif

DESCRIPTORS--/ *water pipes/ *steel pipes/ pipelines/ pipes/ *linings/ portland cement/ *mortars/ protective coatings/ corrosion control/ metal coatings/ mixes/ rehabilitation/ maintenance/ operation and maintenance/ steel linings/ construction/ conduits

IDENTIFIERS--/ *in place pipe linings/ mortar linings (pipes)

R202785X68A OROS SPILLWAY MODEL TESTS

Oros Dam in northeastern Brazil is a 54-m-high earth dam impounding 3.2 million cu m of water. The importance of the structure, unfavorable local siting conditions, and large floodwater spillway capacity required laboratory model tests for design of the spillway and stilling basin. The spillway site has a restricted width presenting serious problems in designing an efficient stilling basin for a heavy discharge. An undistorted 1:100 scale model was selected as the most appropriate. The spillway is a ski-jump type. The nappe is guided to the bucket, flipped forward and upwards, and broken into a fan so as to distribute the mass of water over the widest possible area. The downstream bed is protected from the water impact by a reinforced concrete stake barrier firmly anchored into rock.

R202785X68A

Ottoni Netto, Theophilo B; Junior, Leonino; Tosta de Oliveria, Diney

OROS SPILLWAY MODEL TESTS

Water Power, Vol 20, No 2, pp 67-71, Feb 1968. 5 p, 10 fig

Laboratorio Hidrotecnico Saturnino de Brito S/A, Rio de Janeiro, Brazil

DESCRIPTORS--/ *hydraulic models/ *spillways/ *stilling basins/ energy dissipation/ flood/ foreign projects/ foreign design practices/ model tests/ flip buckets/ baffles/ hydraulic laboratories/ hydraulic structures/ erosion control/ nappe

IDENTIFIERS--/ Oros Dam, Brazil/ Brazil/ *ski-jump spillways

R202799X67A NEW DESIGN METHOD FOR CONCRETE STRUCTURES

A draft "Instructions of Designing Concrete and Reinforced-concrete Hydraulic Structures" was drawn up in 1965 in the USSR to replace existing standards SN55-59. The new instructions standardize methods for design based on limiting states. Sections are included on design of reinforced concrete structures subjected to repeated loads, calculations on the effect of temperature and humidity, reduction of stresses in corrosive zones, and design of precast prestressed structures. The limiting states considered are bearing capacity, deformations and displacements, and the formation or opening of cracks. Design in terms of limiting states systematically accounts for the principal factors involved in structural function by using design coefficients for overload, homogeneity of materials, and service conditions. The paper discusses design of hydraulic structures subjected to repeated loads, cracking, hydrostatic uplift, and placement of transverse reinforcement. The new standardized methods economize on material, increase the reliability and longevity of structures, and unify calculation methods with those used for industrial, civil, and transport structures.

R202799X67A

Shvetsov, A V; Sokolov, I B; Lamkin, M S; et al

THE PRINCIPAL REQUIREMENTS IN NEW STANDARDS FOR THE DESIGN OF CONCRETE AND REINFORCED-CONCRETE HYDRAULIC STRUCTURES

Hydrotech Constr, No 2, pp 152-159, Feb 1967. 8 p, 2 fig, 3 tab

DESCRIPTORS--/ *concrete structures/ *hydraulic structures/ *foreign design practices/ *design standards/ reinforced concrete/ deformation/ reinforcing steel/ precast concrete/ prestressed concrete/ cracking/ uplift pressures/ loads/ bearing capacities/ displacements/ locks/ safety factors/ temperature/ humidity/ structural design

IDENTIFIERS--/ USSR/ repeated loading/ design improvements/ design practices

R202828 63A NEW LOOK AT PENSTOCK ENTRANCE DESIGNS
Experiences with a half-open, fixed-wheel gate covering a penstock bellmouth entrance indicated that conventionally designed penstock bellmouths may be larger than economically justifiable. As the result of a value engineering study of the problem made by the Bureau of Reclamation, a modified entrance structure was designed. A smaller bellmouth and gate were used based on the premise that entrances for low-velocity penstocks need not be as large as those for high-velocity conduits. Hydraulic model tests were used to prove this concept and develop a design for comparison with an existing conventional design. Estimated savings of $13,000,000 in construction costs will be realized when similar bellmouth, gate, hoist, trashrack, and appurtenant structures are used in the new Grand Coulee Third Powerplant penstock entrances. This powerplant, to be added to the existing Grand Coulee Dam, is planned to contain ultimately twelve 600,000-kw units. Hydraulic model tests, made to confirm general hydraulic concepts and to develop an exact bellmouth shape for the Grand Coulee Third Powerplant, indicated that smaller bellmouths were not only economically desirable but could be designed to perform better hydraulically.

R202828 68A

Peterka, Alvin J and Lindholm, Ernest A

A NEW LOOK AT PENSTOCK ENTRANCE DESIGNS

Pap Western Water Power Symp, Los Angeles, Calif, Apr 8-9, 1968. 10 p, 8 fig, 1 tab

Bureau of Reclamation, Denver, Colo

DESCRIPTORS-/ *penstocks/ *entrances/ *hydraulic gates and valves/ stop logs/ laboratory tests/ hydraulic models/ low pressures/ gates/ fixed wheel gates/ head losses/ trashracks/ costs

IDENTIFIERS-/ valve engineering/ Flaming Gorge Dam, Utah/ *cost savings/ Grand Coulee Pwrplt, Wash/ innovation/ bellmouths

R202830 67A THE MALPASSET DAM FAILURE
This report summarizes research by a group of engineers executing the final instructions of Andre Coyne to find causes of this dramatic dam failure. Malpasset Dam failed on Dec 2, 1959. It was the first total failure in the history of arch dams. Examination of the ruins indicated that the arch itself was not to be blamed either in principle or in execution. Failure occurred in the foundation of the entire left abutment. Motivating agent in the failure was pore water pressure in the rock. The pore pressure condition would not have triggered the failure if 3 conditions at the site had not existed: (1) nature of the rock which would normally be satisfactory, (2) geometry of the structure of the rock mass foundation, particularly the foliation, and (3) a fault downstream from the dam. Geology of the site is discussed. A description of the dam before, during, and after the failure is given. Much information was obtained about the failure by examination of blocks from the arch deposited downstream.

R202830 67A

Bellier, Jean

THE MALPASSET DAM

Travaux, Vol 50, No 389, pp 363-383, July 1967. Transl from French, Bur of Reclam Transl 742, Jan 1968. 67 p, 22 fig, 12 photo, 6 ref

DESCRIPTORS-/ *dam failures/ *dam foundations/ geology/ *arch dams/ pore pressures/ geologic investigations/ *concrete dams/ abutments/ foreign construction/ structural behavior/ rock mechanics/ faults (geology)/ rock foundations/ geologic formations/ structural analysis/ deformation/ pore water pressures
IDENTIFIERS-/ Malpasset Dam, France/ rock properties/ foreign research/ geologic defects/ France

DEMINERALIZATION

R202791X68A WATER DESALTING PLANT--KEY WEST, FLORIDA
Completion of the world's largest single-unit, multistage flash evaporation desalting plant, with a capacity of 2.62 million gallons per day, provides Key West, Florida, with the most economical means of supplying water needs for a growing population. Over 50,000 people in the Key West area will be supplied with purified sea water at a plant cost of approximately 85 cents per thousand gallons. A comprehensive study is made of 5 different proposed plans and the reasons given for selecting the present system. A general description of the plant and its principal systems of operation are discussed. Sufficient instrumentation and control equipment have been provided to insure operation under all load conditions with a minimum of operating personnel.

R202791X68A

Anon

THE SEA WATER DESALTING PLANT AT KEY WEST, FLORIDA

Water Water Eng, Vol 72, No 863, Jan 1968. 7 p, 11 fig, 2 tab

DESCRIPTORS../ *demineralization/ *sea water/ costs/ economics/ *fresh water/ evaporators/ distillation/ condensers (liquefiers)/ wells/ fuel oils/ pipelines/ aqueducts/ water requirements/ cost comparisons/ pH/ instrumentation/ automatic control

IDENTIFIERS../ *potable water/ multistage flash distill/ brines/ Florida Keys/ flash distillation/ Florida/ scale prevention/ *domestic water

DRAINAGE AND GROUND WATER

R202809X68A WELL LOGGING IN GROUND WATER HYDROLOGY
The Geological Survey is conducting research on the application of borehole geophysics to ground water hydrology. Although most petroleum well logging techniques may be utilized in hydrology, modifications in equipment and interpretation are necessary because of basic economic and environmental differences between petroleum and ground water evaluation. If logging is to be widely applied to ground water exploration and evaluation, the expense of equipment and services must be reduced. Fortunately, this can be done, because most water wells are not as deep as oil wells and the temperatures and pressures are lower. The following logging devices are utilized in the evaluation of ground water environments: spontaneous potential, resistivity, gamma, gamma-gamma, neutron, radioactive tracer, flowmeter, caliper, fluid resistivity, gradient and differential temperature, and sonic velocity. Lightweight logging sondes and control modules are operated by 1 man, either on a vehicle-mounted 6000-ft logger or on a suitcase-mounted 500-ft logger. An inexpensive magnetic tape system has been developed and is used routinely for log recording and playback.

R202809X68A

Keys, W Scott

WELL LOGGING IN GROUND-WATER HYDROLOGY

Ground Water, Vol 6, No 1, pp 10-18, Jan-Feb 1968. 9 p, 8 fig, 12 ref

Geological Survey, Denver, Colo

DESCRIPTORS../ *wells/ *logging/ *logs/ *ground water/ aquifers/ electric analogs/ models/ measuring instruments/ tracers/ radioactive isotopes/ gamma rays/ isotopes/ neutron counters/ magnetic tapes/ boreholes/ temperature

IDENTIFIERS../ *groundwater hydrology/ nuclear probes/ *well logging/ gamma probes/ brines

DRAINAGE AND GROUND WATER

R202810 67A GROUND WATER CHANGES DURING IRRIGATION

During 1962-1965 changes in ground water level and mineralization in newly irrigated virgin soils of the USSR Golodnaya Steppe were investigated. Observations of water level and mineralization were made from 3 profiles passing through the study area. Tables and charts are given recording the observed changes. Conclusions drawn were: (1) the ground water rose an average of 2-3 m per yr mainly from percolation of irrigation water on the fields; (2) ground water rose more rapidly in higher elevated irrigated areas and near canals because of uneven distribution of irrigation water resulting from high soil water permeability during the 1st yr of irrigation; (3) an uneven distribution of irrigation water after 5-6 yr of irrigation leads to creation of a desalinized quantity of ground water in the higher areas while highly mineralized ground water rises in the lower areas; (4) to improve the beneficial state of the lower areas and to increase the effectiveness of drainage work, the length of the drainage network must be increased and differential leaching performed. Drains should not be located near canals.

R202810 67A

Molodtsov, V A and Dokuchayev, V V

CHANGE IN GROUNDWATER DEPTH AND MINERALIZATION DURING IRRIGATION OF VIRGIN SOILS OF THE GOLODNAYA STEPPE

Soviet Soil Sci, No 5, pp 679-684, May 1967. 6 p, 2 fig, 3 tab, 13 ref

DESCRIPTORS-/ *ground water/ permeability/ moisture content/ leaching/ *water table/ water quality/ *irrigation/ *salinity/ *salts/ drainage/ percolation/ soil profiles/ loams/ clays/ sands/ minerals/ soluble salts/ sulfates/ chlorides

IDENTIFIERS--/ USSR/ saline soils

ELECTRICAL ENGINEERING

R202816X68A BASIC PRINCIPLES OF PLANNING VAR CONTROL

Study and evaluation of generation, transmission, and consumption of reactive power in a transmission network is a necessary part of power system planning. Kilovars and kilowatts should be provided as part of electric service, and a basic task of the system planner is to find the most technically desirable and economically attractive method of supply. The American Electric Power System's broad principles used to plan var supply and control are described. This planning incorporates reliability, operating, and economic factors. Reliability is important and as a result many types of var sources are used, including generators, synchronous condensers, static capacitors, and shunt reactors. These source locations are widely distributed and are under local, automatic control to respond rapidly to system disturbances. There can be no compromise in the objective of maintaining a flexible and reliable transmission network capable of carrying large blocks of power from one end of the system to the other. Planning an adequate and effective var control is important in achieving this goal.

R202816X68A

Nagel, Theodore J and Vassell, Gregory S

BASIC PRINCIPLES OF PLANNING VAR CONTROL ON THE AMERICAN ELECTRIC POWER SYSTEM

Inst Elec Electron Engs Trans Power App Syst, Vol PAS-87, No 2, pp 448-495, Feb 1968. 8 p, 9 fig, 10 ref, disc

American Electric Power Service Corp, New York, N Y

DESCRIPTORS-- / *electric power production/ transmission (electrical)/ *electric power demand/ reliability/ economics/ planning/ capacitors/ control/ electric power/ automatic control/ energy/ design criteria/ extra high voltage/ electrical networks/ electric generators/ electrical equipment

IDENTIFIERS--/ interconnected systems/ synchronous machines/ *reactive loads/ *system stability (elect)/ shunt reactors/ electric utilities

R202817X68A EXCITATION UNDER ABNORMAL CONDITIONS

Modern generator excitation systems provide good voltage regulation at normal system frequency and assist in maintaining transient stability during disturbances. However, a number of abnormal system operating conditions should be considered in evaluating excitation system performance. Some of these conditions are extended periods of operation at other than normal frequency or voltage, or both simultaneously. These system conditions can cause excessive output from the generator excitation system and impose overloads on generator and power transformer. Excitation system protection schemes are available to recognize excessive excitation and, after a suitable time delay, take corrective action returning operation to safe limits. Details of the circuitry and operation for 5 excitation protection schemes are described.

R202817X68A

Bobo, Powell O; Skooglund, John W; Wagner, Charles L

PERFORMANCE OF EXCITATION SYSTEMS UNDER ABNORMAL CONDITIONS

Inst Elec Electron Engs Trans Power App Syst, Vol PAS-87, No 2, pp 547-553, Feb 1968. 7 p, 8 fig, 1 tab, 1 ref, append, disc

Westinghouse Electric Corp, East Pittsburgh, Pa

DESCRIPTORS-/ *excitation/ electric generators/ overloads/ frequency/ *voltage regulators/ electrical stability/ *power system operations/ electric relays/ power transformers/ solid state physics/ electrical equipment/ semiconductors/ electrical properties/ electric currents/ control
IDENTIFIERS-/ overvoltage/ performance/ power system stability/ relay systems/ *magnetic amplifiers/ protection (electrical)

R202818X68A TESTING EHV STATION INSULATOR PERFORMANCE

Two phases of wet testing ehv station insulators are described; one for conventional rainfall tests with prescribed rate of precipitation and water resistivity and the other for artificial contamination or pollution tests under wet conditions. A change in USA Standards for rate of precipitation and resistivity of water is recommended, and test data confirm the effectiveness of this new proposal to distinguish between satisfactory and unsatisfactory insulator design. The proposed contamination test procedure is convenient to use, gives reproducible results, and is sufficiently flexible for use in varying the severity of applied artificial contaminant according to user requirements. The artificial contamination, or pollution test may be used in rating insulator designs for performance under contaminated and wet conditions. Test procedures are given and test results are tabulated.

R202818X68A

Phelps, James D M; Owens, James B; Foti, Arem

TESTING EHV STATION INSULATION FOR PERFORMANCE IN CONTAMINATED CONDITIONS

Inst Elec Electron Engs Trans Power App Syst, Vol PAS-87, No 2, pp 448-454, Feb 1968. 7 p, 2 fig, 7 tab, 6 ref, disc

American Electric Power Service Corp, Canton, Ohio; I-T-E Circuit Breaker Co, Greensburg, Pa

DESCRIPTORS-/ extra high voltage/ test facilities/ test procedures/ wet condition/ fogs/ electrical coronas/ electrical engineering/ electric potential/ *contamination/ electrical conductance/ *electric insulation/ transmission (electrical)/ rainfall/ faults (electrical)

IDENTIFIERS-/ *electrical insulators/ electrical insulation tests/ test results/ *flashover/ leakage current/ testing equipment

R202819X68A SAFETY IN LIVE LINE MAINTENANCE

Live line maintenance often receives little consideration in design of new lines. Establishment of minimum safety clearances will contribute to inclusion of maintenance requirements in line design. In the absence of standards governing insulation levels and clearances for live line maintenance practices, recommendations for minimum requirements are based on the following: (1) Recommendations are intended to establish safety minimums and are not a working guide. Additional clearances or higher safety factors are the prerogative of the user. (2) Minimum safe clearances and acceptance tests for new or reconditioned equipment intended for use in live line maintenance are premised on switching surges that reasonably can be expected to occur while live line maintenance is in progress. Presumably such work will not be performed when a lightning flashover at the immediate worksite is anticipated. (3) Particular attention has been directed to flexibility in order that future practices may not be impeded by outmoded rules. Proposed acceptance specifications and certification tests for insulated aerial lift equipment are tabulated.

R202819X68A

IEEE Committee

RECOMMENDATIONS FOR SAFETY IN LIVE LINE MAINTENANCE

Inst Elec Electron Engs Trans Power App Syst, Vol PAS-87, No 2, pp 346-352, Feb 1968. 7 p, 3 fig, 4 tab, 3 ref, disc

DESCRIPTORS--/ *safety/ *transmission lines/ standards/ dry condition/ *maintenance/ clearances/ electric insulation/ maintenance personnel/ maintenance equipment/ electric potential/ electrodes/ safety factors/ extra high voltage/ electrical coronas/ *power O&M/ hazards/ wet condition/ electric currents
IDENTIFIERS-- / *live line maintenance/ flashover/ electrical design/ electrical insulators/ switching surges/ leakage current

R202825X68A STATIC RELAYS FOR DISTANCE PROTECTION

Ease of designing transistor comparators for distance relays to be used for high-speed operation must be tempered with consideration of overall performance and integrity of operation. Operating speed must be defined over the working range of the relay, and neither speed nor measuring accuracy should be affected by severe transients generated by modern ehv networks. The transistor comparator affords great freedom of design for specific laws of operation and characteristics, as no counterpart exists in the electromechanical relay where basic characteristics are limited by behavior of the element itself. Design principles of transistor distance relays are discussed at length. Static and dynamic performance curves are given for a prototype relay tested in the laboratory and under field service conditions. Close agreement exists between specified performance and field test data. Results justify confidence in the laboratory tests performed.

R202825X68A

Jackson, L; Patrickson, J B; Wedepohl, L M

DISTANCE PROTECTION: OPTIMUM DYNAMIC DESIGN OF STATIC RELAY COMPARATORS

Proc Inst Elec Engs (Engl), Vol 115, No 2, pp 280-287, Feb 1968. 8 p, 17 fig, 11 ref, append

A Reyrolle & Co, Ltd, Hebburn; University of Manchester, Great Britain

DESCRIPTORS--/ *electric relays/ *transistors/ electrical conductance/ *electronic equipment/ electronics/ field tests/ laboratory tests/ extra high voltage/ characteristics/ electromagnetic properties/ sensitivity/ performance tests/ electrical engineering/ electrical stability

IDENTIFIERS--/ *electrical design/ response time/ Great Britain/ accuracy/ foreign research

R202800X67A ROCK FOUNDATION DEFORMABILITY

The main index of rock deformability used in design of concrete dams is the modulus of total deformation. This modulus is determined by laborious and expensive static plate loading tests at the site. These values characterize deformation properties of rock in a very limited volume of the mass, equivalent to a geometric point in the foundation at a large dam, and have a probable error of 20 to 30%. Therefore, other methods are necessary to estimate the deformability of rock foundations. Such methods include geophysical prospecting, geological studies, quantitative evaluation of jointing, and experimental model investigations. Used separately, these methods do not give satisfactory results, but in combination often reveal distinct correlations. Correlations between the modulus of total deformation and modulus of elasticity from static tests on rock specimens, dynamic modulus of elasticity, density, coefficient of joint voids, seepage, and seismic longitudinal wave velocity are discussed. The geologic structure can be evaluated only by utilizing complex correlations between different rock properties and interpretation of data superimposed on a geostructural model of a rock

R202800X67A

Gureev, A M

DEFORMABILITY OF ROCK FOUNDATIONS OF DAMS

Hydrotech Constr, No 2, pp 180-185, Feb 1967. 6 p, 10 fig, 6 ref

DESCRIPTORS-/ *dam foundations/ damsites/ concrete dams/ abutments/ *deformation/ foundation investigations/ foundation bearing tests/ foreign design practices/ elasticity modulus/ seepage/ seismic waves/ seismic investigations/ boreholes/ static tests/ *rock mechanics/ *rock foundations/ *engineering geology/ geologic investigations
IDENTIFIERS-/ USSR/ *rock properties/ joint systems/ structural geology/ rock joints/ plate load tests/ correlation/ foreign testing

R202801X66A STABILITY OF BASES OF ANCHOR FOUNDATIONS

Experiments were performed under field conditions on foundation models containing buried slab anchors with diameters of 40, 60, 80, 100, and 120 cm, about 1/2 to 1/3 the size of prototype foundation anchors for electrical transmission lines. Vertical and inclined foundation models were investigated. Test conditions and the pullout apparatus are described. Purpose of the investigation was to determine: (1) bearing capacity of bases of anchor foundations as a function of slab diameter and (2) size and shape of zones of propagation of elastic and plastic deformations, including deformation of the horizontal surface of the earth. Typical test results are given and the influence of various factors discussed. Bearing capacity of bases is strongly affected by the forces of friction and cohesion of the soil as well as the soil density.

R202801X66A

Kananyan, A S

EXPERIMENTAL INVESTIGATION OF THE STABILITY OF BASES OF ANCHOR FOUNDATIONS

Soil Mech Found Eng, No 7, pp 387-392, Nov-Dec 1966. 6 p, 5 fig, 6 tab

DESCRIPTORS-/ *anchors/ model tests/ *foundations/ foundation bearing tests/ foundation investigations/ transmission towers/ apparatus/ slabs/ internal friction/ cohesion/ deformation/ plastic deformation/ elastic deformation/ bearing capacities/ cracks/ friction/ shear forces/ footings
IDENTIFIERS-/ *pull-out tests/ foreign research/ USSR/ soil density/ failure surfaces/ anchor plates

R202802X66A STRESSES IN SOILS UNDER FOUNDATIONS

An investigation was made of types of gages used to measure soil pressures under foundations. Gages were located at the contact surface between the soil and foundation and buried in the soil at varying distances from the contact surface. A schematic of 1 type of gage is given. The contact gages were embedded in 2 reinforced concrete blocks, one a rigid strip and the other a plate. The foundation soil was a recompacted fine-grained sand. Location of the gages relative to the contact surface indicated differences in contact pressures. The buried gages showed substantially larger stress values at the edges of the foundation than the contact gages. For proper response to contact pressure, gages should be set flush with the base of the foundation or other construction where the contact pressure is desired. Sensitivity and stability of soil gages with electroacoustical measuring systems are higher than gages with wire converters.

R202802X66A

Lazebnik, G E; Smirnov, A A; Simakov, V I; et al

MEASURING STRESSES IN SOILS UNDER FOUNDATIONS

Soil Mech Found Eng, No 5, pp 322-326, Sept-Oct 1966. 5 p, 4 fig, 6 ref

DESCRIPTORS--/ *soil pressures/ *foundations/ stress distribution/ soil mechanics/ stress-strain curves/ measuring instruments/ instrumentation/ soils/ gages/ dynamometers/ strain gages/ *pressure gages/ *pressure measuring equip/ footings

IDENTIFIERS--/ embedded instruments/ foreign research/ USSR

R202832 68A STRUCTURES ON PILES IN LAKE DEPOSITS

Engineering experience derived from foundation investigations, design, and construction of 2 pile-supported pumping plants on soft, lean-clay lake sediments is reported. A complete discussion of the foundation problems is presented with details of several novel test methods and full-scale field observations. The project requirements necessitating siting the plants on poor foundations are outlined. With general soil characteristics known from Willard Dam investigations, the exploration program was designed to locate specific sites where soils of greatest firmness existed. Field investigations included undisturbed sampling, in-place penetration tests, pile loading tests, and vane shear tests adjacent to the test piles. Special laboratory tests were conducted to evaluate changes in soil compressibility due to pile driving and to study changes in pile bearing strength with time. Procedures for the field pile testing program are outlined, and settlements recorded during and after foundation construction are discussed. Validity and value of the foundation testing program were confirmed by settlement observations.

R202832 68A

Anon

PILE SUPPORTED STRUCTURES IN LAKE DEPOSITS

Bur Reclam Res Rep 11, 1968. 40 p, 32 fig, 9 tab

DESCRIPTORS--/ *pile foundations/ *foundation investigations/ vane shear tests/ stability analysis/ friction piles/ pumping plants/ model tests/ *settlement/ test procedures/ soil compression tests/ finegrained soils/ pile driving/ wood piles/ penetration tests/ backfills/ excavation/ clays/ soil investigations/ sediments/ silts

IDENTIFIERS--/ *pile tests/ pile-driving formulas/ Willard Pumping Plant, Utah/ Utah

GEOLOGY AND GEOPHYSICS

R202795X68A REMOTE SENSING OF SOILS AND ROCKS

Uses of various airborne sensors in engineering surveys of soils and rocks are discussed. The sensors include cameras, infrared and passive microwave mappers, radar, spectrometers, laser, radiofrequency, and induction devices. Applications include identifying and delimiting soil and rock units and locating soil and rock materials suitable for engineering purposes. The data also provide information about surface and subsurface conditions that would affect ease of excavation, slope stability, and suitability for subgrade, foundation, or fill materials. Many potentially valuable sensors are not being exploited or considered because of the cost of converting developments in sensor technology and data interpretation into routine engineering practice. Although sensor technology imposes limits, capability could be advanced by developing techniques to accurately and routinely interpret data in terms of engineering parameters. Has 45 references.

R202795X68A

Parker, Dana C

DEVELOPMENTS IN REMOTE SENSING APPLICABLE TO AIRBORNE ENGINEERING SURVEYS OF SOILS AND ROCKS

Mater Res Stand, Vol 8, No 2, pp 22-30, Feb 1968. 9 p, 45 ref, disc

University of Michigan, Ann Arbor

DESCRIPTORS../ *sensors/ *radar/ infrared rays/ *aerial photography/ photogrammetry/ soil surveys/ *soil investigations/ rocks/ *geologic investigations/ laser/ soil classifications/ costs/ economics/ bibliographies/ photography/ engineering geology/ reconnaissance surveys

IDENTIFIERS../ *airborne surveying/ airborne equipment/ *remote sensing/ EROS/ rock properties/ images/ infrared imagery/ photointerpretation

HYDRAULICS

R202815 67A CAVITATION IN HYDRAULIC STEEL STRUCTURES

Cavitation is the formation of hollow spaces in a fluid under the influence of a negative pressure. In hydraulic engineering the cavitation phenomenon is evidenced by damage to structures such as turbine runners or pump impellers. Civil engineers have only recently encountered cavitation problems. With higher head and higher velocity flows, cavitation damage is found in inlet structures, tunnels, pipelines, weir crests, stilling basins, weir gates, and especially in high-head gates and valves. Usually cavitation damage is associated with the steel portion of the structure. However, concrete is also subject to cavitation damage. Frequently the flow pattern is influenced by the steel portion of the structure and the cavitation takes place downstream in the concrete. A superficial observation would blame the steel structure alone, whereas the problem involves total design. The inner processes in cavitating flows and their physical relationships are discussed.

R202815 67A

Hartung, F

CAVITATION RESEARCH PROBLEMS IN HYDRAULIC STEEL STRUCTURES

Deutscher Stahlbau Verband, pp 125-140, June 1966. Transl from German, Bur of Reclam Transl 720, 29 p, 20 fig

Technical Institute, Munich, Germany

DESCRIPTORS../ *cavitation/ hydraulic structures/ *fluid flow/ spillways/ *negative pressures/ hydraulic engineering/ high pressure gates/ design/ high pressure valves/ hydraulic gates and valves/ hydraulic turbines/ pumps/ tunnels/ intake structures/ pipelines/ bubbles/ turbulent flow/ outlet works

IDENTIFIERS../ cavitation control/ cavitation noise/ hydraulic design/ *cavitation parameters/ foreign research/ Germany/ Bernoulli Theorem

R202820 67A PHOTOCOUNTER FOR FLUORESCENT TRACERS
An electronic photometric counter was developed and constructed by Delft Hydraulics Laboratory, Netherlands, for quantitative measurement of fluorescent tracers in sediment transport studies. Sediment transport can be derived from measured weight and volume concentrations by applying the least squares method and theoretical calculation of tracer particle dispersion. The instrumentation requirements are: (1) quick and accurate tracer-concentration determination, (2) discrimination of various grain sizes, and (3) discrimination of the origin of different tracers. As sieving can be done separately, instrumentation can be simplified by making the determination of concentration after sieving. Origin of the tracers can be determined by using different colors and making measurements for each color on a 1-channel instrument adjustable for various colors. The apparatus consists of a mechanical sample feed system, an ultraviolet light and photomultiplier optical system, and an electronic signal processing and counter system. The calibration of the instrument is discussed. Main sources of errors are sampling, poor coatings of fluorescent tracers on particles, counter efficiency, and variations in particle sizes and shapes.

R202820 67A

DeVries, M

PHOTOMETRIC COUNTER FOR FLUORESCENT TRACERS

La Houille Blance, No 7, pp 717-722, 1967. 6 p, 7 fig, 1 ref

Delft Hydraulics Laboratory, Netherlands

DESCRIPTORS-- / *tracers/ *sediment transport/ sediment sampling/ sands/ sedimentation/ *fluorescence/ particle shapes/ particle size/ particles/ grain sizes/ coatings/ ultraviolet rays/ colors/ counters/ electronic equipment/ measuring instruments/ instrumentation/ hydraulics

IDENTIFIERS-- / foreign products/ Netherlands/ fluorometers/ *photometers/ photomultipliers

R202839 67A JET FLOW PATTERNS IN STREAMS & RESERVOIRS
An experimental study of the modification of jet flow patterns by a nearby free surface is described. The tests were conducted in an 18-ft-dia, 4-ft-deep reservoir. One flow pattern, for a 1/2-in.-dia nozzle submerged 5 in. below the free surface was studied in detail. Other combinations of nozzle diameter, submergence and discharge were used to study the locus of the maximum velocity of the flow pattern as the flow moved downstream. In addition, the influence of an intake placed close to the jet was investigated. The flow patterns were found to be quite different from those for a deeply submerged jet. The maximum velocity moves upward as the flow proceeds downstream and eventually reaches the free surface. The lower part of the velocity distribution closely resembles that for a deeply submerged jet, whereas, the upper part is modified by wave action at the free surface. As a result there is increased spreading of the flow pattern at the free surface. A nearby intake was found to have negligible influence on the flow pattern. The velocities induced in the region of the jet by the intake are very low relative to those in the jet itself. The jet discharge is concentrated in a narrow conical form whereas the intake gathers fluid from all directions.

R202839 67A

Maxwell, W Hall C and Pazwash, Hormoz

BASIC STUDY OF JET FLOW PATTERNS RELATED TO STREAM AND RESERVOIR BEHAVIOR

University of Illinois Water Resources Center Rep 10, July 1967. 63 p, 29 fig, 2 plate, 5 tab, 11 ref

University of Illinois, Urbana

DESCRIPTORS-- / *diffusion/ flow/ hydraulics/ *jets/ air-water interfaces/ boundaries (surfaces)/ *flow characteristics/ *flow profiles/ *free surface/ interfaces/ *nozzles/ velocity distribution

IDENTIFIERS--

HYDRAULICS

R202853 66A ROUGHNESS COEFFICIENTS IN RIVERS
This study was concerned with the influence of ice, vegetation, and scouring on the flow rate in a channel connecting 2 reservoirs. When flow occurs in an open channel, resistance is encountered by the water as it flows downstream. This resistance is generally countered by the components of gravity forces acting on the body of the water in the direction of the motion. If the resistance is balanced by the gravity forces, a uniform flow will be developed. Therefore, under uniform conditions, the flow in a channel is dependent on the hydraulic radius (or water depth, in a wide channel), the frictional coefficient, and the channel slope. Various investigations on the relationship between water depth and the frictional coefficient have been done. However, in this study special attention was paid to the influences of the ice cover, the vegetation and scouring at the river surface on the frictional coefficient. The relationship between the river roughness coefficient and the stage of the upstream lake was investigated. A relationship of the form of an exponential function was determined. It was found that the river roughness coefficient decreases with increases in the stage of Lake Huron, though other factors also affect this relationship.

R202853 66A

Graf, Walter H

THE HYDRAULICS OF CHANNELS, CONNECTING TWO RESERVOIRS, WITH SPECIAL ATTENTION TO THE PROBLEM IN THE GREAT LAKES, TECHNICAL REPORT 9

Cornell University Water Resources Center Technical Rep 9, Nov 1967. 98 p, 164 fig, 2 chart

Cornell University, Ithaca, N Y

DESCRIPTORS-- / *fluvial hydraulics/ *roughness coefficients/ *open channel flow/ open channels/ *ice/ vegetation/ Reynolds number/ river beds/ *rivers/ river flow/ stage-discharge relations/ uniform flow/ *ice-water interfaces

IDENTIFIERS-- / ice forming/ *ice cover/ *St Clair River/ Lake Huron

HYDROLOGY

R202804X67A U S CONTRIBUTIONS TO IHD
The main contributions of the U S to the International Hydrological Decade have been in basic data compilations, glaciological studies, regional or large-basin studies, education, and research on hydrological phenomena and techniques. The U S also participated in UNESCO missions by assisting other countries to prepare IHD programs. A summary of the proposed U S program was published by the U S National Committee in 1965 and revised in 1966. This paper summarizes U S activities and contributions from April 1966 to May 1967. Basic data collection from Decade stations and hydrological bench marks is briefly reviewed. Progress in various studies on inventories and water balances is reported. Methodology improvements are given for use of mathematical models for runoff prediction and hydrological forecasting, and measurement of snowpack, snowfall, and rainfall. Cooperative studies, information exchange, and education and training are discussed. IHD-sponsored or organized conferences during the period between the 2nd and 3rd sessions of the coordinating council are listed. The different but related purposes of the IHD and the U S Water for Peace program are explained. Has 56 references.

R202804X67A

Heindl, L A

CONTRIBUTIONS OF THE UNITED STATES TO THE INTERNATIONAL HYDROLOGICAL DECADE - 1966-1967

Water Resources Bulletin, Vol 3, No 4, pp 7-23, Dec 1967. 17 p, 56 ref

National Research Council, Washington, D C

DESCRIPTORS-/ *hydrologic data/ *hydrology/ hydrologic instruments/ hydrometeorological station/ water balance/ glaciers/ watersheds/ snow surveys/ ice/ sediment transport/ droughts/ rainfall/ ground water/ surface water/ forecasting/ runoff forecasting/ digital computers/ data processing systems/ meteorology/ bibliographies
IDENTIFIERS--/ mathematical models/ *International Hydrolog Dec/ water budget

R202822 68A RAINSTORMS MADE TO ORDER
A computer controlled rainfall simulator has been developed by Ven Te Chow of the University of Illinois to produce artificial rainstorms. The simulator can develop storms of any intensity pattern, repeat them at any interval desired over all types of terrain, and measure runoff from the terrain with given conditions of absorption and other parameters, to an accuracy never before obtainable. The rainfall can be released over any part, or all, of a 40- by 40-ft artificial terrain. Types of storms are programmed and stored on computer tape so they can be started, stopped, or repeated at will. The terrain simulated can range from lush water basin areas to arid desert. Water runoff is accurately measured. Major objective of the entire study is to investigate basic laws of flow mechanics of surface water over artificial watersheds. Descriptions of the electronic simulator an operation of major components are given.

R202822 68A

Hoyt, L Arthur

RAINSTORMS MADE TO ORDER

Public Works, Vol 99, No 3, pp 95-98, Mar 1968. 4 p, 1 fig, 2 photo

Electronic Associates, Inc, West Long Branch, N J

DESCRIPTORS-/ *rainfall/ rainfall intensity/ simulation/ *artificial precipitation/ computer programming/ hydrology/ runoff/ *surface runoff/ watersheds/ *storms/ laboratory tests/ laboratory equipment

IDENTIFIERS-/ *rainfall simulators/ rainfall-runoff relation/ artificial watersheds/ hydrometeorology

R202852 67A RESERVOIR SEDIMENTS AFFECT WATER QUALITY
This project studied the influence of temperature, on (1) the rate at which the chemical characteristics of the bottom deposits undergo changes, and (2) the chemical effects of these changes on the quality of the overlying waters. The experiment was conducted in deposit-water contact columns which simulated the conditions existing in the hypolimnion of an impoundment. The data indicate that the rate of chemical change was influenced directly by temperature, and that nearly all change took place by diffusion from the deposit within the first month of contact. During this period the deposits became increasingly compacted. The rate of dissolved oxygen depletion increased with temperature and organic content of the deposit. The peak concentration of total nitrogen was reached between the 4th and 6th week, and this peaking time was not affected by temperature and the amount of organic matters in the bottom deposit. The peak concentrations of orthophosphates and polyphosphates were reached between the 2nd and 4th week and this peaking time was not affected by temperature or the amount of organic matters in the bottom deposits. Data are given on iron concentration in stagnant waters.

R202852 67A

Feng, Tsuan Hua

CHEMICAL EFFECTS OF BOTTOM DEPOSITS ON QUALITY OF IMPOUNDED WATERS

Office of Water Resources Res Rep A-011-Mass, Jan 1968. 33 p
15 fig, 8 tab

University of Massachusetts, Amherst

DESCRIPTORS-/ limnology/ sediments/ *reservoirs/ *water quality/ iron/ dissolved oxygen/ *temperature/ chemical properties/ nitrogen/ *lakes/ phosphates/ *impounded waters/ *bottom sediments/ stagnant water/ impoundments/ hypolimnion/ *eutrophication/ organic matter/ benthos

IDENTIFIERS-/ *Benthic deposits

IRRIGATION

R202808 67A HYDRAULIC AUTOMATIC CONTROLS IN CANALS

Several institutions in the USSR Central Asian republics have cooperated to develop an automated system of hydraulic controls for irrigation canals. After studying extensively foreign and domestic systems of upstream and downstream controls, they devised a mixed-control system, actuated by direct and reflected hydraulic surges in the canal. This system combines the advantages and features of both upstream and downstream hydraulic controls without some of the separate disadvantages, but requires canal bottom slopes to be less than 0.0003 and costs 9 to 22% more to build than a system with upstream control only. However, the mixed control system is easier to operate and more flexible and reliable. Excess water in the canal for any cause is wasted from reach to reach to the terminal wasteway, preventing damage from overfilling and eliminating need for wasteways in each reach. With a shortage of water this system is capable of equal distribution of water to all reaches and more equitable distribution to each turnout, preventing accidental unwatering of any reach. The system makes possible fulfillment of the water-use plan without unnecessary waste of surplus water and prevents water deficit due to improper operation of the canal system.

R202808 67A

Khamadov, I B; Eingorn, F Ia; Om, L A

SYSTEMS OF HYDRAULIC AUTOMATIC CONTROL IN IRRIGATION CANALS

Gidrotekhnika i Melioratsiia, No 3, pp 36-48, 1967. Transl from Russ, US Bur Reclam Transl 723, Jan 1968. 35 p, 6 fig, 12 ref

DESCRIPTORS../ *irrigation canals/ irrigation practices/ hydrodynamics/ irrigation systems/ water requirements/ automation/ *automatic control/ demand (irrigation systems)/ canal design/ check structures/ turnouts/ hydraulic structures/ hydraulic systems/ water delivery/ irrigation O&M/ cost comparisons/ water measurement/ water surface profiles/ *surges
IDENTIFIERS../ USSR/ water level/ headworks/ water distribution/ water use

MATERIALS ENGINEERING

R202806X67A PLASTIC DRAINAGE PIPE TESTS

Laboratory tests were conducted on 4-in. polyethylene drainage pipe subjected to various earth loads under different trench conditions. Conclusions were: (1) Plastic pipe fails by deflection rather than by rupture of the walls. A 5-in.-dia cradle excavated in undisturbed earth, designed to support a 160 deg section of the pipe, should provide support for loadings up to 300 lb per linear ft. Quicksand surrounding a pipe provides support equal to that of a cradle. (2) Concave curvature of the top of the semirigid plastic pipe begins at a deflection of about 20% of its diameter. Additional load can be applied; however, almost complete collapse of 4-in.-id pipe occurs after deflection to a vertical inside diameter of about 2.4 in. (3) Laboratory tests using a cradle, indicated that a deflection to 3.1 in. would be tolerable under similar field conditions. This would permit a loading not to exceed 300 lb per linear ft and permit an extra 50 to 75% safety factor. (4) To minimize load plastic pipe should be placed in a narrow trench approximately 10 in. wide. To provide lateral support for the semirigid pipe, a 4-1/2- or 5-in.-dia cradle should support 160 deg of the pipe circumference.

R202806X67A

Myers, V I; Rektorik, R J; Wolfe, C A Jr

DEFLECTION TESTS AND TRENCH CONDITIONS FOR PLASTIC DRAIN PIPE

Trans Amer Soc Agr Engs, Vol 10, No 4, pp 454-457, 1967. 4 p, 9 fig, 12 ref, disc

U S Department of Agriculture, Weslaco, Tex

DESCRIPTORS../ *pipes/ *plastic tubing/ *plastics/ *deflection/ loads/ polyethylenes/ *trenches/ laboratory tests/ bedding materials/ pressure measuring equip/ strain gages/ slots/ drain tiles/ drainage

IDENTIFIERS../ *plastic pipes/ Marston formula/ perforations

R202787 67A TURBINES FOR KRASNOIARSK POWERPLANT
Construction details of the world's most powerful vertical, radial-axial (Francis) turbines are described. A comparison of turbine parameters for Bratsk and Krasnoiarsk is made. Generator design with the thrust bearing supported on the turbine headcover permits using a single short shaft between the turbine runner and the generator rotor. Water depressing equipment permits running the turbine in air when operating the hydroelectric unit as a synchronous condenser. The many problems in engineering, manufacturing, and transporting such large pieces of equipment over great distances to the powerplant site are discussed. The turbine runners with a diameter of 7500 mm, height of 4000 mm, and a weight of 235 tons metric were the most difficult pieces to be shipped the 5000-km distance from factory to powerplant.

R202787 67A

Gal'perin, M I

KRASNOIARSK POWER STATION GETS NEW HYDROTURBINES

Gidrotek Stroitel'stvo, No 8, pp 9-13, Moscow, USSR, Aug 1967. Transl from Russ, 10,367 CSO: 1830-S, 8 p, 5 ref

DESCRIPTORS-- / hydroelectric powerplants/ *Francis turbines/ *hydraulic machinery/ thrust bearings/ design/ turbine parts/ turbine runners/ mechanical equipment/ *foreign design practices/ water transportation/ manufacturing/ turbines/ spiral cases/ welded joints/ cavitation/ speed regulators/ servomechanisms/ welding/ *hydraulic turbines
IDENTIFIERS-- / Krasnoiarsk Powerplant USSR/ USSR/ *machine design/ comparative studies/ *turbine head covers/ generator shafts

R202788 67A NEW-DESIGN HYDROELECTRIC UNITS INTRODUCED
The 500-mw hydroelectric units for Krasnoiarsk Powerplant, largest of domestic or foreign installations, are described. Special features of the turbines including some problems of design are discussed. Each turbine is equipped with an electrohydraulic speed regulator for automatic operation as a single unit, when operating on a system, or when operating under group regulation. Details of generator construction are given. Generator rotors are forced-air-cooled and the stators have direct water cooling to the windings. Distilled water is supplied for cooling systems of the generator stators and mercury arc rectifiers of the ionic excitation system by 10 electric stills in the powerplant. Generator fire protection is provided by a ring-type sprinkler system, above and below each stator, supplied with water from the spiral cases. Oil storage and purification equipment is located within the powerplant building for handling lubricating and transformer oils. Details are given for station water, and compressed air systems; generator bearings; and weights for turbine and generator components.

R202788 67A

Gamus, I M

NEW-DESIGN HYDROELECTRIC UNITS INTRODUCED

Gidrotek Stroitel'stvo, No 8, pp 3-9, Moscow, USSR, Aug 1967. Transl from Russ, 10,367 CSO: 1830-S, 12 p, 3 fig, 2 ref

DESCRIPTORS-- / hydroelectric powerplants/ mechanical equipment/ cooling/ electrical equipment/ *Francis turbines/ *electric generators/ thrust bearings/ *hydraulic machinery/ fire safety/ compressed air/ *foreign design practices/ dewatering/ spiral cases/ speed regulators/ *hydraulic turbines/ servomechanisms/ excitation/ instrumentation
IDENTIFIERS-- / Krasnoiarsk Powerplant USSR/ USSR/ *machine design

R202821X68A FRANCIS TURBINES FOR MURRAY 2 POWERPLANT
A brief discussion of Australia's multipurpose Snowy Mountain Hydroelectric Project is followed by a detailed description of the 216,000 BHP turbines manufactured by Hitachi for installation at the Murray 2 Powerplant. All parts of the turbine exposed to flowing water are made of 13-chrome stainless steel because of the rigid requirement for material having a low-temperature impact value without sacrificing wear resistance or hardness. Special provisions were made for compressed air depression of tailwater to permit quick switchover to synchronous condenser operation. Draft tube liners, pressure relief discharge pipes, and pit liners were manufactured by Australian firms in accordance with Hitachi's drawings.

R202821X68A

Ito, Hideo; Ozawa, Teruo; Doi, Takao

216,000 BHP (161,000) FRANCIS TURBINES FOR MURRAY 2 POWER STATION, AUSTRALIA

Hitachi Rev, Vol 17, No 2, pp 46-51, Jan 1968. 6 p, 9 fig

Hitachi, Ltd, Tokyo, Japan

DESCRIPTORS-- / hydroelectric power/ hydroelectric powerplants/ *Francis turbines/ foreign design practices/ *hydraulic turbines/ irrigation/ multiple purpose projects/ manufacturing/ *stainless steel/ *turbine runners/ turbine parts/ turbines

IDENTIFIERS-- / Australia/ *Snowy Mtns Hydro-Elect Auth

R202826 67A CAVITATION RESISTANCE PARAMETERS
Cavitation resistance parameters for selection of alloys are briefly reviewed. Elastic-plastic strain energy, derivable from an engineering stress-strain curve, is proposed as a new parameter. The proposed parameter is shown to correlate well with observed cavitation resistance of the alloys tested. The total strain energy concept is shown to conform with experimental observations of: (1) critical wave energy or threshold velocity concept, (2) ordering of observed cavitation resistance of the alloys, (3) accelerated cavitation damage observed on some alloys in cavitation environments, and (4) varying ratio between the cavitation resistance of some alloys when exposed to different cavitation wave energies. Has 23 references.

R202826 67A

Backstrom, T E

A SUGGESTED METALLURGICAL PARAMETER IN ALLOY SELECTION FOR CAVITATION RESISTANCE

Bur Reclam Rep ChE-72, Chem Eng Br, Dec 1967. 34 p, 13 fig, 3 tab, 23 ref, disc

Bureau of Reclamation, Denver, Colo

DESCRIPTORS-- / *cavitation/ alloys/ metallurgy/ test procedures/ bubbles/ materials failures/ mechanical properties/ *metals testing/ ultrasonics/ bibliographies/ shock waves/ *materials testing/ stress-strain curves/ erosion/ metals/ stress/ elastic deformation/ elasticity modulus/ tensile strength/ plastic deformation
IDENTIFIERS-- / cavitation control/ *cavitation resistance/ *strain energy/ *cavitation parameters/ ultrasonic cavitation tests

R202831 68A FRANCIS TURBINES AT BUKHTARMINSK

The Bukhtarminsk Hydroelectric Powerplant with 8 Francis turbines and 1 diagonal turbine became operational during 1966. Six of the turbines are identical; the others are of more modern design. One turbine is provided with a dual-flow spiral case. No undesirable phenomena have been observed in this dual-flow unit during steady operation or under fluctuating loads; turbine head cover vibration and shaft wobble have not exceeded normal values. The speed rings of these turbines were made in 4 sections and butt-welded to their spiral cases at the powerplant site. Construction of the guide vanes and operating mechanism, turbine head cover, runner, shaft, guide bearings, and turbine control equipment are discussed. Runner cavitation and deterioration of cladding appeared to be the greatest problems encountered during the initial operating experience reported.

R202831 68A

Shriro, I I

FRANCIS TURBINES AT THE BUKHTARMINSKAYA HYDROELECTRIC POWER STATION

Joint Publications Res Serv Transl 44,528, Feb 28, 1968. 6 p, 3 fig, 4 ref

DESCRIPTORS-/ hydroelectric powerplants/ *Francis turbines/ cavitation/ construction/ foreign design practices/ spiral cases/ servomechanisms/ *hydraulic turbines/ bearings/ turbine runners/ turbine parts/ guide vanes/ mechanical engineering/ mechanical equipment/ hydroelectric power/ stainless steel
IDENTIFIERS-/ USSR/ Bukhtarminsk Pwrplt, USSR/ *turbine head covers/ cladding

R202805 67A MEASURING SNOW DEPTHS BY PHOTOGRAMMETRY

Reliability and usefulness of aerial photogrammetric snow surveys are discussed. Aerial photogrammetry has been used successfully to measure snow depths at several thousand points in a 100-acre study basin in southwestern Idaho. The research demonstrates that photogrammetry is a practical method for quantitatively analyzing patterns of snow accumulation and melt in large areas with varying snow distribution. Midwinter snow distribution in the study basin ranges from less than 1/2 ft to more than 20 ft within 100 ft. To compare photogrammetric depths with field measurements, 31 randomly located points were selected on a 50-ft grid. The standard deviation of a point measurement error was about 0.7 ft and appeared to be independent of snow depth. Magnitude of error can be reduced when automatic data equipment is used and field controls are more accurate. If horizontal and vertical controls are adequate and snow surfaces are read by experienced professional operators, quite shallow snow depths averaging even less than 0.5 ft can be measured with satisfactory precision. One limiting feature of the method concerns inability to estimate directly from a photogrammetric map the water content of the snow.

R202805 67A

Smith, F M; Cooper, C F; Chapman, E G

MEASURING SNOW DEPTHS BY AERIAL PHOTOGRAMMETRY

Proc Western Snow Conf, pp 66-72, Apr 18-20, 1967. 7 p, 4 fig, 2 ref

U S Department of Agriculture, Boise, Idaho; University of Michigan, Ann Arbor; Aerial Mapping Co, Boise, Idaho
DESCRIPTORS-/ *snow/ *snow surveys/ measurement/ *aerial photography/ data reduction/ *photogrammetry/ field control/ maps/ stereoscopic photography/ watersheds/ errors

IDENTIFIERS-/ snow pack/ snow cover/ snow fences/ standard deviation/ photointerpretation/ Idaho

PROJECT PLANNING

R202824 68A ECONOMIC EVALUATION OF PROJECTS

Every engineering project requires thorough studies of technical and economic feasibilities to facilitate success. This paper embodies the total principle but concentrates on the economic aspect, because of the author's conviction that history of Canadian projects demonstrates a real weakness in this area. The problem of inadequate economic evaluation is aggravated by confusion of approaches and methods in use, many appearing to be of questionable value. Use of various techniques may produce conflicting conclusions drawn from a given situation, thus emphasizing need for adopting a uniform approach to economic evaluations. The proposed standardized approach requires development of a conceptual framework with universal application. Economic evaluations must be made at each stage within the framework before proceeding to the next. A checklist for economic evaluations is given. Time and costs for economic evaluations will probably increase for worthy projects. However, these increases will be offset by savings arising from early rejection of unsound projects. Has 15 references.

R202824 68A

Magyar, William B

ECONOMIC EVALUATION OF ENGINEERING PROJECTS

Eng Econ, Vol 13, No 2, pp 67-85, Jan-Feb 1968. 19 p, 4 fig, 15 ref

Resources Engineering of Canada Ltd, Toronto

DESCRIPTORS-/ *economics/ *feasibility studies/ *project feasibility/ cost comparisons/ costs/ project planning/ projects/ flow diagrams/ finance/ optimum development plans/ preliminary investigations/ bibliographies/ benefit-cost ratios

IDENTIFIERS-/ *economic evaluation/ economic feasibility/ engineering economy/ standardization/ cost-benefit analysis/ cost analysis

OPERATION AND MAINTENANCE

R202814 67A PIPELINE REJUVENATION WITH EPOXIES

Gas piping installed in 1941 for Bellevue Naval Housing Community, Washington, D C, had corroded to such an extent that minor repairs were no longer feasible and a complete rejuvenation or abandonment of the system was necessary. A method of lining the existing pipe with glass fiber reinforced epoxy resin was tested and found successful. The relining method uses the existing pipe as a mold and forms a 1/8-in. lining bonded to the interior walls of the pipe. The epoxy lining seals existing leaks, and while the effective cross-sectional area of the pipe is reduced, flow is not proportionately reduced due to the ceramic-like surface of the epoxy lining. The pipes are lined by a 3-step procedure: (1) brushed and blown clean, (2) plunged to seal leaks, and (3) lined using a special tool. The method is very rapid and requires only a minimum number of excavations. The relined pipe is equivalent to a new gas system, is immune to later effects of internal corrosion, and was installed at Bellevue at a cost savings of 50%. Further tests on relining steam condensate return lines indicate epoxies may be an economical and highly satisfactory answer to public utility pipeline maintenance problems.

R202814 67A

Heacock, L D and Franklin, D B

EPOXY: APPLICATIONS RELATING TO PIPELINE REJUVENATION

Navy Civil Eng, pp 21-23, Sept 1967. 3 p, 9 photo, 1 tab

U S Naval Station, Washington, D C

DESCRIPTORS-/ *pipelines/ pipes/ *linings/ maintenance/ operation and maintenance/ rehabilitation/ *repairing/ *epoxies/ glass fibers/ gases/ corrosion/ *corrosion control/ protective coatings/ public utilities/ plastics/ steam

IDENTIFIERS-/ epoxy resins/ glass reinforced plastics

R202849 67A COST OF WASTE WATER TREATMENT PLANTS
The cost associated with building and operating waste water treatment plants or individual waste water processes has always been difficult to estimate for planning purposes. This is particularly true if the cost of the process must be related to the effectiveness of the process in removing water contaminants such as biological oxygen demand, nitrogen, or phosphorus. Many cost studies are available from the literature or from government-sponsored research, but the individual engineer often has access to only a limited number of these studies. Assumptions made in these studies and the cost items included or omitted often vary with the amount of effort invested in the study or the background and interests of the person conducting the study. A great deal of information is available, however, and this report is an effort to bring together in one place most of the useful cost information now available using a consistent set of assumptions and omissions for the purpose of producing a working document useful to engineers and scientists working in the field of waste water treatment. Has 23 references.

R202849 67A

Smith, Robert

A COMPILATION OF COST INFORMATION FOR CONVENTIONAL AND ADVANCED WASTEWATER TREATMENT PLANTS AND PROCESSES

Federal Water Pollut Contr Admin Rep, Washington, DC, Dec 1967. 9 p, 32 fig, 8 tab, 23 ref

Cincinnati Water Research Laboratory, Ohio

DESCRIPTORS-/ *sewage treatment/ *waste treatment/ *costs/ *tertiary treatment/ waste disposal/ *sewage works/ engineers estimates/ capital costs/ estimating/ *waste water/ water treatment/ sewage disposal/ sewage works/ activated sludge/ trickling filters/ electrodialysis/ bibliographies
IDENTIFIERS--/ *advance waste treatment/ sewage plant equipment

R202784 67A SOIL INVESTIGATION USING PROJECTILES
A new method for remote and rapid soil investigation using high-speed, earth-penetrating projectiles is described. Since 1962 about 700 full-scale earth penetrations have been accomplished using long, slender, instrumented projectiles dropped from aircraft. The projectiles contain accelerometers and other instruments, and broadcast their decelerations during earth penetration through a long trailing antenna. Decelerations experienced by the projectile are used to estimate material properties. The entire determination is completed from the air, and the resulting profile data identify weak and strong soils, granular and cohesive soils, and layer interfaces including bedrock. Profile data are similar and nearly as applicable as the standard penetration test. Two examples that compare results obtained using the new method with the actual soil profile are given. The method is most useful for preliminary soil investigations where ground access or time are problems and can be used under water. Has 26 references.

R202784 67A

Caudle, W N; Pope, A Y; McNeill, R L; et al

THE FEASIBILITY OF RAPID SOIL INVESTIGATIONS USING HIGH-SPEED, EARTH-PENETRATING PROJECTILES

Int Symp Wave Propagation & Dynamic Properties Earth Mater, Pap, Aug 1967. 32 p, 9 fig, 26 ref

Sandia Laboratory, Albuquerque, N Mex; Woodward-Clyde-Sherard & Ass, Oakland, Calif
DESCRIPTORS--/ *soil investigations/ *soil profiles/ soil surveys/ soil physical properties/ penetration/ *penetration tests/ bedrocks/ fins/ *penetration resistance/ preliminary investigations/ accelerometers/ deceleration/ aerodynamics/ underwater foundations/ bibliographies/ *geologic investigations/ foundation investigations
IDENTIFIERS--/ projectiles/ soil engineering

R202807X67A DYNAMIC SHEARING RESISTANCE OF SOILS

Soil-shearing stress values were measured for 3 soils. Each soil was tested at 4 moisture levels and 3 density levels for each moisture. Two interchangeable ring-shear mechanisms of different diameters were mounted on the arm of a large centrifuge to obtain the shearing stress at different loading velocities. A maximum shearing-stress value and an initial yield point value were obtained and analyzed by statistical procedures. Although data collected are limited in application to similar shearing mechanisms and soil types, the fact that reliable equations could be developed indicates a definite relationship between strain rate or loading velocity and soil-shearing stress. The relationship is strongly dependent on soil type, soil moisture, soil density, and to some degree on sample size. Lack of ability to obtain better predictions when all 3 soils are used in the regression equation indicates some factors are not included and may be undefined. Perhaps new terms need to be defined when only 1 soil is considered. Data for initial yield point indicate some definite phenomenon occurs before maximum shearing stress develops. Further study may define a more realistic variable for dynamic cohesion of a soil. Has 15 references.

R202807X67A

Hanson, T L; Johnson, H P; Young, D F

DYNAMIC SHEARING RESISTANCE OF SOILS

Trans Amer Soc Agr Engs, Vol 10, No 4, pp 439-447, 1967. 6 p, 8 fig, 5 tab, 15 ref

Montana State University, Bozeman; Iowa State University, Ames

DESCRIPTORS-/ *shear resistance/ *soils/ live loads/ *shear/ *shear strength/ loading rate/ soil moisture/ soil tests/ strain measurement/ density/ statistical analysis/ cohesion/ remolded soil samples/ shear stress/ bibliographies/ dynamics/ soil mechanics/ laboratory equipment/ shear forces
IDENTIFIERS-/ dynamic loads/ regression analysis/ dynamic tests/ strain rate/ soil dynamics

R202811 67A WATER PERMEABILITY DISTRIBUTION

Two methods are recommended for resolving the problem of whether distribution of water permeability values for a given plot can be considered as normal. The first method involves determining water permeability of a plot by making a large number of replications and constructing a graph of frequencies. The second method involves the tube method. Both are discussed and differences in results are analyzed. Reasons for asymmetrical distribution are theorized. Conclusions drawn are: (1) distribution of water permeabilities differs considerably from normal distribution in the process of determining soil water permeability by means of the tube method and is characterized generally by a high positive asymmetry, (2) distribution of logarithms of water permeabilities, although closer to normal than distribution of water permeabilities, still differs reliably from normal distribution, and (3) mean water permeability should be described in ordinary soil studies by the arithmetic mean water permeability and not by the median or its geometric mean.

R202811 67A

Dmitriyev, Ye A and Manucharov, A S

ASYMMETRICAL DISTRIBUTION OF WATER PERMEABILITIES

Soviet Soil Sci, No 5, pp 620-626, May 1967. 7 p, 3 fig, 13 ref

Moscow State University Biology-Soil Institute, USSR

DESCRIPTORS-/ *permeability/ *distribution/ soil physical properties/ soils/ soil physics/ soil science/ errors/ *soil tests/ statistical analysis/ sampling

IDENTIFIERS-/ *asymmetry/ eccentricity/ skewness/ USSR/ foreign research

R202827X67A STRUCTURAL DESIGN OF PIPELINE CASING PIPE

Design and use of protective casing pipe, a pipe of larger diameter through which a carrier pipeline is threaded, is discussed. Main emphasis is on structural design of smooth steel casing pipes installed by boring beneath railroads and highways. A study was conducted on 5 experimental casings under 3 mainline railroads. Carrier pipelines were not installed to allow data to be taken inside the casing. Inspection holes cut in the casing revealed that annular spaces left by oversize cutter heads, 1 to 1-1/2 in. larger in diameter than the casing, were substantially filled and the soil was in tight contact with the pipe. Casing diameters ranged from 30 to 42 in. Static deflections of the casings were nominal, being less than 2/3 of 1% of the pipe diameter. Since flexible pipes fail by excessive deflection, a rational design procedure is to determine maximum deflection of pipe under an anticipated set of conditions. Procedures are given for designing pipes under typical highway and railroad embankments. Recommended thicknesses are 3/16 in. for pipes of 20 in. or less in diameter and 1/4 in. for pipes from 20 to 48 in. These thicknesses are based solely upon structural requirements. Additional thickness for corrosion or handling requirements must be added to these values.

R202827X67A

Spangler, Merlin G

THE STRUCTURAL DESIGN OF PIPE CASING PIPES

Amer Soc Civil Eng Nat Meeting Water Resources Eng, New York, N Y, Preprint 540, Oct 16-20, 1967. 30 p, 10 fig, 5 tab, 6 ref

Iowa State University, Ames

DESCRIPTORS--/ *structural design/ *pipes/ pipelines/ *casings/ flexible tubing/ *steel pipes/ boring machines/ deflection/ passive pressures/ lateral forces/ field tests/ design criteria/ failure (mechanics)/ elastic theory/ embankments/ pressure distribution/ highways/ railroads

IDENTIFIERS--/ *buried pipes/ pipe cover/ pipe tests/ Boussinesq equation

R202794X67A PROBABILITY CONCEPTS IN STRUCTURAL DESIGN

Empirical deterministic concepts in structural engineering lead to design of structures for loadings unlikely to occur. These designs may include factors leading to hazardous structures. Our accumulated knowledge is obscured by deterministic procedures so that rational analysis and design are nearly impossible and even may be legally inadmissible. Structural analysis and design is concerned with performance of real structures under real loadings. Using an elementary concrete beam problem as an example, deterministic concepts are shown to present false and incomplete information. Live loads, windloads, and seismic loads are random variables and probabilistic in nature. Probabilistic concepts are used in quality control and specifications for construction materials, but engineering analysis fails to show this fundamental change in description of materials properties. The engineer should have all pertinent information in usable form and in addition all the techniques for rational decision making and optimization to show uncertainty of performance or value of a given performance. As challenges in structural design increase, deterministic views of structural safety must give way to probabilistic concepts.

R202794X67A

Benjamin, Jack R

FALLACIES AND PITFALLS IN THE DETERMINISTIC APPROACH TO STRUCTURAL SAFETY

Amer Soc Civil Engs Nat Meeting Water Resources Eng, New York, N Y, Conf Preprint 531, Oct 1967. 30 p, 15 fig, 1 tab, 13 ref

Stanford University, Calif

DESCRIPTORS-/ structural analysis/ *structural design/ structural steel/ building materials/ design criteria/ *probability/ building codes/ live loads/ hazards/ safety/ quality control/ loads/ specifications/ decision making/ costs/ *optimum design/ failure (mechanics)/ seismic design/ reinforced concrete

IDENTIFIERS--/ dynamic loads/ empirical methods/ design practices

STRUCTURAL AND ARCHITECTURAL ENGINEERING

R202812X68A STRESS TRANSFER BETWEEN CONCRETE MEMBERS
Strength of flat slabs near columns was investigated by 17 tests involving combined shear and unbalanced moment loadings. Sixteen reinforced concrete slab-column specimens containing square or rectangular interior columns and one specimen with a square edge column were tested. Narrow rectangular holes were located adjacent to the columns in 8 of the specimens. Reversals of loading simulating earthquake effects were applied to 3 of the specimens. The test specimens and test procedure used during the investigation are described. Four design methods for shear strength computation are evaluated in terms of Johannes Moe's data and the data from these tests. A modification of the ACI-ASCE Committee 326 method is recommended for practical design.

R202812X68A

Hanson, Norman W and Hanson, John M

SHEAR AND MOMENT TRANSFER BETWEEN CONCRETE SLABS AND COLUMNS

J Portland Cement Ass Res Develop Lab, Vol 10, No 1, pp 2-16, Jan 1968. 15 p, 16 fig, 4 tab, 13 ref

Portland Cement Association, Chicago, Ill

DESCRIPTORS-/ *columns/ concrete testing/ concrete structures/ moments/ *shear tests/ *slabs/ flat plates/ flexural strength/ shear failures/ *structural analysis/ shear/ *reinforced concrete/ building codes/ stress analysis/ design/ eccentric loading/ cracks/ structural engineering

IDENTIFIERS-/ earthquake loads/ ultimate strength design

WATER POLLUTION

R202834 68A GRANT AWARDS BY FWPCA--1967
A listing of research grants, demonstration grants, training grants, and research fellowships awarded in 1967 by the Federal Water Pollution Control Administration as authorized in Section 5 of the Federal Water Pollution Control Act, Public Law 660, as amended. The purposes of these grants are to encourage, cooperate with, and assist appropriate agencies, institutions, and individuals in the conduct of studies and training relating to the causes, control and prevention of water pollution. This listing is divided into 5 sections: (1) summary of awards, fiscal year 1967, (2) research grants, (a) summary of grants by states, and (b) complete list of research grants, (3) demonstration grants, (a) summary of grants by states, and (b) complete list of demonstration grants, (4) training grants, (a) summary of grants by states, and (b) complete list of training grants, and (5) research fellowships, (a) summary of awards by states, and (b) complete list of research fellowships.

R202834 68A

Anon

WATER POLLUTION CONTROL RESEARCH AND TRAINING GRANTS: 1967 GRANT AWARDS

Federal Water Pollut Contr Admin Publ CWA-10, 1968. 79 p, 5 tab

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS-/ research and development/ training/ *pollution abatement/ *grants/ *water pollution control/ water pollution

IDENTIFIERS-/ *fellowships

R202835 67A FEDERAL WATER POLLUTION CONTROL ACT
This publication contains the Federal Water Pollution Control Act as amended by the Federal Water Pollution Control Act amendments of 1961 - (PL87-88), the Water Quality Act of 1965 - (PL89-234), and the Clean Water Restoration Act of 1966 - (PL89-753). Appendices include: (1) Reorganization Plan No. 2 of 1966; (2) Executive Order 11288 - Prevention, Control and Abatement of Water Pollution by Federal Activities. Also included is the text of the Oil Pollution Act as amended by the Clean Water Restoration Act of 1966 - (PL89-753).

R202835 67A

Anon

FEDERAL WATER POLLUTION CONTROL ACT: OIL POLLUTION ACT

Federal Water Pollut Contr Admin Rep, 1967. 35 p, 2 append

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS--/ *water laws/ water quality/ *water pollution/ standards/ *water pollution control/ *water quality control/ oil wastes/ water pollution effects/ *legislation

IDENTIFIERS--/ *Federal Water Poll Cont Act/ *Oil Pollution Act/ oil pollution

R202836 67A ENFORCING WATER QUALITY STANDARDS
In this presentation the author discusses, in respect to water pollution, provisions of the constitution of the United States, concurrent Federal and state jurisdiction, development of enforcement provisions, enforcement procedures where health and welfare are affected by water pollution, establishing water quality standards, enforcing water quality standards, and court test of standards.

R202836 67A

Stetina, Henry P

PROTECTING THE HEALTH AND WELFARE OF PERSONS AFFECTED BY WATER POLLUTION AND ENFORCING WATER QUALITY STANDARDS, FEDERAL JURISDICTION AND CONGRESSIONAL ACTS
Federal Water Pollut Contr Admin Rep, May 1967, 9 p

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS--/ water laws/ water pollution/ *water quality/ legislation/ impaired water quality/ federal jurisdiction/ state jurisdiction/ standards/ *water quality act/ public health/ water pollution effects/ *pollution abatement/ water pollution control/ *water quality control/ legal aspects
IDENTIFIERS--/ *water quality standards/ enforcement/ Federal Water Poll Cont Act/ Oil Pollution Act

R202837 67A METHANE-OXIDIZING BACTERIA
The basic objective of this study was to determine if methane-oxidizing bacteria can oxidize various aromatic waste products in sewage or natural waters. Bacteria which oxidize methane are known to oxidize other substances while they are growing on methane. Tests were conducted on a large number of these bacteria to determine whether they could oxidize benzene-based organic compounds. None of the methane-oxidizing bacteria attacked benzene rings. Bacteria which attack benzene (or aromatic) rings contain an unusual enzyme called benzene hydroxylase which is not found in methane-oxidizing bacteria.

R202837 67A

Kallio, R E

CO-OXIDATION OF ORGANIC MOLECULES BY METHANE-OXIDIZING BACTERIA GROWING AT THE EXPENSE OF METHANE

University of Illinois Water Resources Center Rep 11, July 1967. 5 p, 1 fig, 1 tab

University of Illinois, Urbana

DESCRIPTORS--/ bacteria/ methane/ benzenes/ oxidation/ *methane bacteria/ organic wastes/ aromatic compounds/ sewage treatment/ waste water/ cultures/ microorganisms/ wastes/ sewage/ biological treatment/ *biodegradation/ enzymes

IDENTIFIERS--

R202838 66A DELAWARE ESTUARY WATER QUALITY STUDY
This study covers the length of the Delaware River from Trenton, New Jersey, to Liston Point, Delaware. This 86-mi stretch of river, known as the estuary because of the influence of astronomically caused tidal motions, is encompassed by one of the most heavily populated and industrialized areas in the country. This preliminary report consists of a general review of the Delaware Estuary Comprehensive Study, together with the alternative water quality goals, costs and benefits, and control schemes that were considered. Objectives of the Comprehensive Study were: (1) determine the cause and effect relationships between pollution from any source and the deteriorated quality of the water in the estuary, (2) develop methods of water quality management including the development of techniques of forecasting the variations in water quality due to natural and manmade causes, and (3) prepare a comprehensive program for the improvement and maintenance of water quality in the estuary including the waste removals and other control devices necessary to manage the quality of water in the estuary for municipal, industrial, and agricultural water use, and for fisheries, recreation, and wildlife propagation.

R202838 66A

Anon

DELAWARE ESTUARY COMPREHENSIVE STUDY: PRELIMINARY REPORT AND FINDINGS

Federal Water Pollut Contr Admin Rep, Washington, DC, July 1966. 94 p, 46 fig, 21 tab, 2 append

Federal Water Pollution Control Administration, Philadelphia, Pa

DESCRIPTORS--/*water quality/ water utilization/ *water pollution/ costs/ benefits/ *pollution abatement/ *Delaware River/ municipal wastes/ *water pollution control/ industrial wastes

IDENTIFIERS--/ *Delaware Estuary

R202840 66A BIOLOGICAL REFERENCES--FRESH & SALT WATER
This bibliography of selected references on water pollution control, waste treatment and water treatment, revises and updates earlier publications on various aspects of water pollution biology (Public Health Service Publications No 214 and 1053, and Technical Report No W-61-4). Most references in the previous publications have been retained in this book, and selected references from 1962 through 1965 have been added. The revisions and additions and the expansion to include the marine aspects with those of fresh water should be helpful in providing source material under one cover for those engaged in the study of pollution as related to aquatic life.

R202840 66A

Stewart, R Keith; Ingram, William Marcus; Mackenthum, Kenneth M; et al

WATER POLLUTION CONTROL, WASTE TREATMENT AND WATER TREATMENT, SELECTED BIOLOGICAL REFERENCES ON FRESH AND MARINE WATERS

Federal Water Pollut Contr Admin Publ WP-23, Washington, DC, 1966. 126 p, 4 plate

Robert A Taft Sanitary Engineering Center, Cincinnati, Ohio

DESCRIPTORS--/ *water pollution control/ *water treatment/ sea water/ *waste treatment/ aquatic life/ aquatic environment/ fresh water/ algae/ *pollution abatement/ industrial wastes/ water quality/ bibliographies/ sewage treatment/ biology/ potable water/ algal control/ nutrients

IDENTIFIERS--

R202841 67A LEATHER TANNING AND FINISHING POLLUTANTS
Engineering and economic data have been critically studies by means of a total industry approach. The relationship of the product to the alternative subsystem manufacturing processes has been reviewed. Because of the wide diversity of plants and processes, the authors have attempted to achieve a comprehensive overview of the approximate subprocesses. The authors have evaluated the total relationship of products produced, waste pollution load, economics involved, and long term environmental quality factors. The comprehensive survey of the Leather Tanning and Finishing Industry included a thorough literature search, administration and evaluation of a comprehensive industry-wide questionnaire, numerous visits and contacts with national tanning association and trade organization representatives, and visits to representative tanning plants. Has 60 references.

R202841 67A

Anon

COST OF CLEAN WATER, VOL III: INDUSTRIAL WASTE PROFILES, NO 7, LEATHER TANNING AND FINISHING

Federal Water Pollut Contr Admin Publ IWP-7, Sept 1967. 60 p, 60 ref

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS--/ *wastes/ industries/ *industrial wastes/ water reuse/ *treatment facilities/ *waste disposal/ industrial plants/ costs/ *waste water treatment/ economics/ waste water disposal/ *waste treatment/ bibliographies/ pollution abatement/ water pollution/ *stream pollution

IDENTIFIERS--/ *leather industry/ *tannery wastes

R202842 67A INDUSTRIAL WASTE PROFILES: POLYMERS
This profile study of Standard Industrial Code (SIC) 28210 represents one segment of the total analysis of major contributors of waterborne pollution. Since prior investigations of this industrial classification and related fields have developed only broad generalizations, the objective was to develop more precise data. Thus the purposes of this profile study were (1) to identify, quantify, and qualify processes and wastes, gross waste quantities, waste reduction practices, and waste reduction cost information, (2) to summarize these various facets of the waste picture, and (3) to make projections on future product growth.

R202842 67A

Anon

COST OF CLEAN WATER, VOL III: INDUSTRIAL WASTE PROFILES, NO 10, PLASTICS MATERIALS AND RESINS

Federal Water Pollut Contr Admin Publ IWP-10, Washington, DC, Oct 1967. 90 p, 15 fig, 3 tab, 6 ref

IIT Research Institute Technology Center, Chicago, Ill

DESCRIPTORS--/ *plastics/ economics / resins/ epoxy resins/ industries/ wastes/ *industrial wastes/ water reuse/ *treatment facilities/ costs/ waste disposal/ industrial plants/ *waste water treatment/ cellulose/ *waste treatment/ waste water disposal/ water pollution/ *polymers/ waste water/ pollution abatement
IDENTIFIERS--/ vinyl resins/ phenolic resins/ polystyrene/ acrylics/ alkyd resins/ copolymers/ polyolefins/ polyesters/ urea resins

R202843 67A COMPUTER SIMULATION OF STREAM POLLUTION
A medium sized analog computer was used in the simulation of dissolved oxygen (DO) and biochemical oxygen demand (BOD) concentration profiles in a thermally polluted stream. One dimensional, steady-state mass dispersion models were used for the DO and BOD simulations. Simulation of temperature profiles were modeled in a similar fashion to those used for the DO and BOD equations. Dispersion of DO, BOD, and heat energy from a planar source were simultaneously simulated on an analog computer for a wide variety of boundary or initial conditions. Isothermal and nonisothermal dispersion modeling was extended so as to include a study of temperature profile optimality.

R202843 67A

Davidson, Burton

ANALOG COMPUTER SIMULATION OF STREAM POLLUTION DISPERSION MODELS WITH CHEMICAL REACTIONS

New Jersey Water Resources Res Inst, New Brunswick, Oct 1967. 5 p, 9 fig, 2 photo, append

Rutgers, The State University, New Brunswick, N J

DESCRIPTORS--/ dispersion/ dissolved oxygen/ biochemical oxygen demand/ analog computers/ simulation/ temperature/ *water pollution/ models/ algae/ photosynthesis/ contamination/ pollution abatement/ optimization/ thermal pollution

IDENTIFIERS--

R202844 67A INDUSTRIAL WASTE PROFILE--MOTOR INDUSTRY
This report has been prepared with the primary objective of developing a pollution profile for the Motor Vehicle and Motor Vehicle Equipment Industry. Basically this involved the development of material flow patterns together with the expected quantity of pollutants from each fundamental operation. Projected waste loads and treatment trends have been provided. The replacement values for the existing treatment facilities as well as the anticipated costs for future treatment practices have been included in terms of both capital and operating costs. Existing and projected waste loads and treatment practices have been established for that part of the Motor Vehicle Industry that can be characterized as stamping plants, body and final assembly operations only. Although these 3 operations involve less than 5% of the total Motor Vehicle Industry plant operations (93 of 1950), it involves almost 70% of the total employees (445,000 of 649,401) and accounted for approximately 23% (35 billion gallons per year of 148 billion gallons per year) of the total Motor Vehicle parts and industry water intake in 1966.

R202844 67A

Anon

COST OF CLEAN WATER, VOL III: INDUSTRIAL WASTE PROFILES, NO 2, MOTOR VEHICLES AND PARTS

Federal Water Pollut Contr Admin Publ IWP-2, Washington DC, Nov 1967. 116 p, 51 fig, 3 ref

Calgon Corporation, Pittsburgh, Pa

DESCRIPTORS-- / wastes/ *industrial wastes/ *treatment facilities/ water reuse/ waste disposal/ industrial plants/ *waste water treatment/ costs/ economics/ industries/ waste water disposal/ byproducts/ *waste treatment/ *motor vehicles/ *industrial waste treatment

IDENTIFIERS-- / automobile industry/ motor vehicle industry

R202845 67A INDUSTRIAL WASTE FROM CANNERIES
The following processes are included in initial preparation of canned and frozen fruits and vegetables: trimming, coring and pitting, cutting, peeling, inspection, and grading. These processes, plus plant cleanup from these operations, often contribute about 50% of the total plant waste water volume, a major portion of the plant biological oxygen demand, and except in isolated cases, virtually all of the suspended solids. The converted product handling processes for frozen fruits and vegetables are generally categorized as blanching, washing, cooling, final preparation and inspection, packing, and freezing. The most significant waste here is from the blanching operation. Generally, the final steps in preparing frozen fruit juices are extraction, screening, deoiling, deaeration, pasteurization and concentration, packing, and freezing. Tremendous quantities of solid residues and some liquid wastes result from this operation. On a national basis it is estimated that waste treatment costs this industry approximately 2% of value added in manufacture. This 2% includes in-plant treatment facilities and that portion of industry's taxes attributable to municipal pollution reduction, exclusive of collection system services. Has 60 references.

R202845 67A

Anon

COST OF CLEAN WATER, VOL III: INDUSTRIAL WASTE PROFILES, NO 6, CANNED AND FROZEN FRUITS AND VEGETABLES

Federal Water Pollut Contr Admin Publ IWP-6, 1967. 110 p, 2 plate, 15 tab, 60 ref, 2 append

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS-- / wastes/ industries/ water reuse/ waste disposal/ vegetable crops/ industrial plants/ economics/ *industrial waste treatment/ costs/ *industrial wastes/ *treatment facilities/ *waste water treatment/ waste water disposal/ *waste treatment/ canneries/ fruit crops

IDENTIFIERS--

R202846 67A DAIRY INDUSTRY WASTES AND WASTE WATER
Industrial Waste Profile IWP-9, Dairies, is a qualitative and quantitative description of wastes and waste water generated in the dairy industry identified in SIC Code as 202 Dairy Products. The industry is examined in its important major subdivisions identified by SIC Code as follows: creamery butter, natural and processed cheese, condensed and evaporated milk, ice cream and frozen desserts, fluid milk. The Profile is prepared for the base year of 1963 which permits correlation with 1963 Census of Manufacturers data for production and water use. The waste and waste water estimates are developed from actual plant operating experience, and are correlated with manufacturing processes and are augmented with waste reduction and removal cost estimated. Projections of waste and waste water for future years are developed in detail.

R202846 67A

Anon

COST OF CLEAN WATER, VOL III: INDUSTRIAL WASTE PROFILES, NO 9, DAIRIES

Federal Water Pollut Contr Admin Publ IWP-9, Sept 1967. 166 p, 13 fig, 105 tab, 2 ref

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS-- / *dairy industry/ *milk/ costs/ industries/ water reuse/ *treatment facilities/ waste disposal/ wastes/ industrial plants/ waste water disposal/ economics/ *industrial waste treatment/ *industrial wastes/ *waste water treatment/ waste treatment

IDENTIFIERS--/ *dairies

R202847 66A MARKET FOR ADVANCED WASTE TREATMENT
To assess the present status of waste water treatment, the type of treatment now in use and the amount of waste water discharged were determined for the major streams in the country. About 4% of 100-mi river basins now have full secondary treatment. A study was made to determine the percentage of municipal waste water present in surface supplies of 155 cities of populations of 25,000 or more. The maximum was 18%, and median was 3.5%. Consideration was given in this study to the possibility of logistical imbalances that might occur if advanced waste treatment were applied to nearly all waste waters. If a distillation-adsorption system were used, less than 6% of the Nation's annual fuel consumption would be used and less than 0.5% of the total power generation would be required. Activated-carbon needs would double. If electrodialysis were applied, 4% of the national power would be required. Membrane production would have to increase several thousandfold. Ultimate disposal of concentrates by injection, incineration, and pipelining would create no imbalances. Has 23 references.

Koenig, Louis R202847 66A

STUDIES RELATING TO MARKET PROJECTIONS FOR ADVANCED WASTE TREATMENT

Federal Water Pollut Contr Admin Publ WP-20-AWTR-17, Washington, DC, Dec 1966. 71 p, 8 fig, 13 tab, 23 ref, append

Federal Water Pollution Control Administration, Cincinnati, Ohio

DESCRIPTORS--/ *tertiary treatment/ water reuse/ ultimate disposal/ waste water (pollution)/ *waste water treatment/ distillation/ water quality/ adsorption/ electrodialysis/ water pollution/ municipal wastes/ *sewage disposal/ economics/ *sewage treatment/ bibliographies

IDENTIFIERS--/ waste water use

R202848 67A INDUSTRIAL WASTE PROFILE--STEEL INDUSTRY
This profile study was undertaken to provide the FWPCA with comprehensive information on the waterborne wastes of the blast furnace and steel mill industry. This industry includes establishments primarily engaged in manufacturing hot metal, pig iron, silvery pig iron, and ferroalloys from iron ore and iron and steel scrap; in converting pig iron, scrap iron, and scrap steel into steel; and in hot-rolling steel into basic shapes such as plates, sheets, strips, rods, bars, and tubing. Merchant blast furnaces and byproduct or beehive coke ovens are also included in this industry. Most of the iron and steel industry in the United States is centered in integrated facilities of large corporate enterprises; the 8 largest producers are among the 100 largest industrial corporations in this country. The comparatively small integrated producer in this industry represents a very large industrial complex. Even the smallest producer in the industry may not be considered a very small industrial operation. The estimates of waste loads, waste water volumes, treatment and production methods and costs given in this report are considered to be descriptive of the industry. Every plant has some uniqueness and these differences are important in assessing waste problems. Has 68 references.

R202848 67A

Anon

COST OF CLEAN WATER, VOL III: INDUSTRIAL WASTE PROFILES, NO I, BLAST FURNACES AND STEEL MILLS

Federal Water Pollut Contr Admin Publ IWP-1, Sept 1967. 100 p, 37 tab, 68 ref

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS-/ steel/ iron/ wastes/ industries/ water reuse/ waste disposal/ industrial plants/ economics/ costs/ *industrial waste treatment/ byproducts/ *industrial wastes/ *treatment facilities/ *waste water treatment/ waste water disposal/ *waste treatment

IDENTIFIERS-/ *iron industry/ *steel industry

R202850 68A COST OF CLEAN WATER
The present study represents the initiation of what will be a continuing evaluation, aimed at estimating water pollution control costs with increasing accuracy. Although it has not been possible to arrive at a completely definitive estimate of required costs, it is believed that the present study provides not only a more comprehensive cost estimate than has previously been developed but also a sound base of information upon which to build future analyses. This estimate is expected to improve in accuracy with each yearly updating. This is a summary report (Volume I). Detailed information to support its findings is contained in 3 appendix volumes, Volumes II through IV. Volume II (Detailed Analses) contains descriptions and analyses of the various subject areas which formed the basis for the cost estimates in this summary report. Volume III (Industrial Waste Profiles) consists of 10 studies of major water-using industries which describe the costs and effectiveness of alternative methods of reducing industrial wastes. Volume IV (State and Major River Basin Municipal Tables) includes, for the 50 States and the Water Resources Council River Basins, tables showing the breakdown of estimated construction costs, sanitary sewers, and operation and maintenance costs.

R202850 68A

Anon

COST OF CLEAN WATER, VOL I: SUMMARY REPORT

Federal Water Pollut Contr Admin Rep, Jan 1968. 39 p, 10 tab, 12 ref

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS-/ *costs/ economics/ financing/ water quality/ standards/ water quality control/ wastes/ waste disposal/ waste water disposal/ *treatment facilities/ sewage treatment/ municipal wastes/ industrial wastes/ construction costs/ operating costs/ maintenance costs/ capital costs/ state governments/ *water pollution
IDENTIFIERS-/ Water Quality Act, 1965

R202854 67A DEEP WELL DISPOSAL OF INDUSTRIAL WASTES
The use of deep wells for disposal of some concentrated, relatively untreatable liquid wastes has increased in recent years and it is expected that this method will be widely applied in the future as water pollution control is emphasized. This publication lists 110 industrial waste injection wells and some of their characteristics. The data listed includes: operator of well, well location, date of initiation of operation, total well depth, depth of injection horizon, geologic formations used for injection, chemical and physical character of waste, injection rate, injection pressure (well head), sources of information. Has 31 references.

R202854 67A

Warner, Don L

DEEP WELLS FOR INDUSTRIAL WASTE INJECTION IN THE UNITED STATES: SUMMARY OF DATA

Federal Water Pollut Contr Admin Publ WP-20-10, Washington, DC, Nov 1967. 45 p, 1 fig, 1 tab, 31 ref

Federal Water Pollution Control Administration, Cincinnati, Ohio

DESCRIPTORS-- / *deep wells/ *liquid wastes/ *waste disposal/ waste water disposal/ *injection wells/ ultimate disposal/ industrial wastes/ waste water/ *wells/ injection/ geologic formations/ pollution abatement/ bibliographies

IDENTIFIERS--

R202855 68A ECONOMIC IMPACT OF POLLUTION ABATEMENT
This study presents and evaluates the available data dealing with the requirements of state and local governments to achieve the desired Water Quality Standards for beneficial water uses. The study relates the requirements for sewage treatment plant construction in perspective to other competing projects confronting the affected units of government; and it appraises the major financial and legal problems which will be encountered in implementing the Water Quality Standards. Has 25 references.

R202855 68A

Anon

COST OF CLEAN WATER, THE ECONOMIC IMPACT OF THE CAPITAL OUTLAYS REQUIRED TO ATTAIN THE WASTEWATER QUALITY STANDARDS OF THE FEDERAL WATER POLLUTION CONTROL ACT
Federal Water Pollut Contr Admin Rep, Jan 1968. 227 p, 1 fig, 29 tab, 25 ref, 4 append

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS-- / *costs/ capital costs/ pollution abatement/ standards/ *water quality/ construction costs/ economics/ waste disposal/ sewage treatment/ bibliographies/ financing/ grants/ water quality control/ Water Quality Act/ waste water disposal/ *treatment facilities/ *waste treatment/ municipal wastes/ *waste water treatment/ *economic impact
IDENTIFIERS--

R202857 67A TEXTILE MILL WASTE PRODUCTS
This industrial waste profile is divided into three major sections. The first section surveys the Wool Textile, Weaving and Finishing Industry; the second section, the Cotton Textile Finishing Industry; and the third section, the Synthetic Textile Finishing Industry. All of these industries are complex, variable, and in constant transition. For this reason, the study has emphasized the principal types of textiles produced. For the purposes of this study, it is important to differentiate between the finishing process and the textile operations preceding it. Except for the scouring of raw wool, the making of raw fiber into unfinished cloth or yarn is essentially a dry operation. The finishing operation is a large producer of liquid wastes, however, and is the segment of the industry which concerns us.

R202857 67A

Anon

COST OF CLEAN WATER, VOL III: INDUSTRIAL WASTE PROFILES, NO 4, TEXTILE MILL PRODUCTS

Federal Water Pollut Contr Admin Publ IWP-4, Sept 1967. 133 p, 5 plate, 32 tab, 2 append

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS--/ *industrial waste treatment/ industrial plants/ waste water/ *wastes/ water pollution/ costs/ pollution abatement/ water quality/ industries/ waste disposal/ water reuse/ economics/ *textiles/ *cotton/ byproducts/ *industrial wastes/ *treatment facilities/ *waste water treatment/ waste water disposal/ *waste treatment
IDENTIFIERS--/ synthetics/ *wool/ *textile industry

R202858 67A PAPERMILL WASTE POLLUTION IN PUGET SOUND
The project conducted investigations in 4 parts of Puget Sound and was primarily concerned with the pollutional effects of wastes discharged by 7 pulp and papermills. Each of these mills discharges untreated or partially treated process wastes into estuarine waters. The objectives of the project were to determine the effects of these wastes on water quality and marine life, to delineate their interferences with legitimate water uses, and to ascertain pollution abatement needs. To accomplish these ends, the project conducted an integrated and comprehensive study program of in-plant waste surveys, waste distribution and water quality studies, biological investigations, and economic studies. The points of major waste discharge in the 4 study areas are separated by considerable distances and physical features of land and water. Thus, the pollution incident to each is a distinct and individual situation. This report considers separately each of these areas and the studies conducted therein. Has 60 references.

R202858 67A

Anon

POLLUTION EFFECTS OF PULP AND PAPER MILL WASTES IN PUGET SOUND, A REPORT ON STUDIES CONDUCTED BY THE WASHINGTON STATE ENFORCEMENT PROJECT

Federal Water Pollut Contr Admin Rep, Mar 1967. 473 p, 123 fig, 62 tab, 60 ref

Washington State Pollution Control Commission, Olympia; Federal Water Pollution Control Administration, Portland, Oreg

DESCRIPTORS--/ *water pollution/ water quality/ *saw mills/ estuaries/ *waste disposal/ pollution abatement/ *pulp wastes/ *wood wastes/ pulp and paper industry/ waste treatment/ treatment facilities/ Washington/ Pacific Northwest U S / *water pollution effects/ water quality control/ water pollution control/ marine animals/ marine fish/ *industrial wastes
IDENTIFIERS--/ marine biology/ *Puget Sound, Wash/ Port Angeles, Wash/ Billingham, Wash/ Anacortes, Wash/ Everett, Wash

R202789X68A WASTE TREATMENT EQUIPMENT
New developments in waste treatment and pollution control equipment are reviewed. Water pollution control programs and research by industry and government have stimulated improvements and innovations in treatment methods. New methods employed commercially include organic waste treatment without biological oxidation, sludge treatments that aid dewatering and disposal, recovery of useful products from sludges, package waste treatment units, improved mechanical aeration equipment, and automated monitoring and analysis of waste streams. The review contains a discussion on the destruction of organic matter by aeration, biochemical oxidation, and combustion. The removal of suspended solids and recovery of economical products are discussed. Advanced techniques being developed, such as adsorption, distillation, solvent extraction, and ion exchange are summarized. Methods for controlling thermal pollution include removal of heat and restoration of oxygen. Thermal pollution control equipment manufacturers are listed. Cost for waste treatment though uncertain will be high.

R202789X68A

Bry, T S and Dykes, D R

EQUIPMENT FOR A DIRTY JOB

Chem Week, Vol 102, No 7, pp 69-81, Feb 17, 1968. 10 p, 3 photo

Charles H Kline & Co, Inc, Fairfield, N J

DESCRIPTORS-/ water pollution/ water quality/ water supply systems/ *water treatment/ waste disposal/ waste water/ sewage disposal/ sewage works/ *sewage treatment/ *sanitary engineering/ industrial waste treatment/ sludge/ sludge digestion/ reviews/ *pollution abatement/ oxidation/ sedimentation/ aeration/ digestion tanks/ instrumentation
IDENTIFIERS-/ equipment/ *waste treatment/ waste water treatment/ thermal pollution/ water pollution sources

R202823 68A COUNTY PLANS CLOSED WATER SYSTEM
Two water districts in San Diego County, California, are planning to use the principle of a closed system to furnish needed water supplies. The dry San Diego River bed will be used for a huge underground aquifer estimated to hold 100,000 acre-ft of water and a treatment plant and demineralization plant will reclaim waste water. The system will be such that water can be used over and over again until it is lost to evaporation, transpiration, and unavoidable leaks. The waste water reclamation system with a distribution system for delivering secondary quality water for irrigation purposes has been constructed. Under investigation is the plan to construct and operate facilities for collecting and storing brackish water in the riverbed aquifer and for withdrawing and demineralizing it for return to use through primary and secondary water systems. A description of the existing and proposed works is given.

R202823 68A

Anon

CALIFORNIA COUNTY PLANS A CLOSED WATER SYSTEM

Public Works, Vol 99, No 3, pp 70-72, Mar 1968. 3 p, 1 fig, 2 photo

DESCRIPTORS-/ *water supply systems/ *underground water storage/ water salvage/ *municipal water/ water reuse/ water costs/ demineralization/ aquifers/ brackish water/ waste water/ water treatment/ circulation/ distribution systems

IDENTIFIERS-/ San Diego County, Calif/ California/ Santee Co Water Dist, Calif/ Santee Recreatn Proj Calif/ water districts

R202786X67A NATIONAL FLOOD INSURANCE FUND SIMULATION
A model for simulating a national flood insurance fund is formulated. The objective is to model the fund and to specify optimal or near-optimal values of the premium rates, discount coefficients, initial capitalized value, and the reinsurance structure. The simulation model synthesizes flow traces, maps these into damages, collects premiums, indemnifies losses, collects reinsurance premiums from the insurance industry, and indemnifies that industry's excess losses. Relevant statistics describing the behavior of the fund are accumulated. The mean and variance of simulated annual flood damages for the United States agree well with results of other studies. The agreement is particularly good in view of the paucity of systematically collected flood data in urban areas. Exponential growth in variance of the fund over time was observed. Growth can be controlled by managing the fund.

R202786X67A

Schaake, John C, Jr and Fiering, Myron B

SIMULATION OF A NATIONAL FLOOD INSURANCE FUND

Water Resources Res, Vol 3, No 4, pp 913-929, 4th Quart 1967. 17 p, 4 fig, 10 tab, 6 ref

University of Florida, Gainesville; Harvard University, Cambridge, Mass

DESCRIPTORS-/ *flood/ *simulation/ models/ *flood damages/ hydrology/ urban areas/ computer programming/ digital computers/ statistics/ water management/ *insurance costs/ planning

IDENTIFIERS-/ *insurance/ *flood plain insurance/ stochastic models/ MUSH (Acronym)/ FISP (Acronym)

R202803X67A CALIFORNIA WATER LAW
The legal definition of a water right is given and the origin, description, and interrelationship of various types of surface and underground water rights are discussed. Riparian rights, appropriative rights, overlying rights, pueblo rights, prescriptive rights, and rights to spring water and return flows are explained as recognized in California. The objectives and physical criteria used by the State Water Rights Board for the administration of water appropriation laws are reviewed. Procedures for appropriating water and administrative procedures for determining rights are outlined. Watermaster service has proven to be an effective way to achieve water distribution in accordance with defined priority of rights. As a fair determination of rights cannot be made without some knowledge of prior use, a program for recording water use data has been established. Prior to the U S Supreme Court decision in Arizona vs California, Federal agencies generally relied upon state law. Following the Supreme Court decision, the Federal Government has applied the Reservation Principal, asserting that water rights on Federal reservations are set aside with the lands for reservation purposes. Observations on deficiencies of the California system are discussed.

R202803X67A

Spencer, L C; Johnson, L D; Page, J M; et al

WATER RIGHTS IN CALIFORNIA

Water Resources Bulletin, Vol 3, No 4, pp 36-46, Dec 1967. 11 p, 2 ref

California State Water Rights Board, Sacramento

DESCRIPTORS-/ *water laws/ surface water/ ground water/ water supplies/ water utilization/ water/ *riparian rights/ springs (water)/ laws/ administration/ water management/ water yield/ consumptive use (water)/ return flow/ *water rights

IDENTIFIERS-/ *California/ *appropriation doctrine/ prior appropriation/ water distribution/ pueblo water rights

R202851 68A LOCATING FLOOD PLAINS FROM SOIL MAPS

Soil maps provide a tool for rapid, low-cost delineation of river flood plains, based on the difference in morphology between soils frequently flooded and soils free of flooding. Very rare floods along the Mississippi River inundated over 99% of the soils that would be expected to flood but in addition flooded 7% of the terrace soils. Flooding predicted with soils information was compared with flooding predicted with an engineering study for small streams in a mature landscape in southwestern Wisconsin. For a 100-yr synthetic flood an agreement of plus or minus 4.5% was obtained. Comparison of flooding with soil types for a small stream in a recently glaciated landscape in southeastern Wisconsin indicated that alluvial soils flood frequently and that soils with restricted drainage and soils of fluvial origin also flood frequently. Some of the data are inconclusive owing to the lack of precise flooding information to serve as a basis of comparison. In areas where manmade works do not appreciably alter the stream regimen and where extensive flood plain areas must be delineated, it appears that accurate soil maps, properly interpreted, will give a good estimate of areas subject to flooding. Has 21 references.

R202851 68A

Cain, John M and Beatty, Marvin T

THE USE OF SOIL MAPS IN THE DELINEATION OF FLOOD PLAINS

Water Resources Res, Vol 4, No 1, pp 173-181, Feb 1968. 10 p, 5 fig, 2 tab, 21 ref

Wisconsin State University, River Falls; University of Wisconsin, Madison

DESCRIPTORS-- / *flood plains/ *geomorphology/ soil classifications/ flood/ hydrologic data/ topography/ alluvial deposits/ bibliographies/ fluvial morphology/ drainage/ soils/ soil groups/ Mississippi River

IDENTIFIERS--/ *soil maps

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